

Chapter 10

Vegetation and Wildlife

For an area of its size, California has one of the greatest diversities of natural areas and flora and fauna in North America. California's topography, climate, and soil types provide for a variety of microhabitats and a high degree of endemism - approximately 24 percent of California's plants and a large number of its animals are native exclusively to California (Hickman 1993). Section 10.1 details the existing conditions of the EWA area of analysis. Section 10.2 details the effects of EWA actions on vegetation and wildlife.

10.1 Affected Environment/Existing Conditions

This section describes the existing conditions of each region potentially affected by the EWA program. Section 3.4 provides a description of the baseline to be used for this affects analysis. The focus of this section will be on the natural and agricultural communities within each region and the wildlife associated with these communities. Fish and fisheries issues are discussed in Chapter 9. Additional information about California Endangered Species Act (CESA)/Federal Endangered Species Act (ESA) special-status species and natural community conservation plan (NCCP) communities is contained within the EWA Action Specific Implementation Plan (ASIP) being prepared by the California Department of Water Resources (DWR), the Bureau of Reclamation (Reclamation), the California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NOAA Fisheries). An ASIP is prepared for each CALFED action or groups of actions as they are proposed for implementation. ASIPs are designed to provide the information necessary to initiate project-level compliance with the ESA, CESA, and Natural Community Conservation Planning Act (NCCPA) (CALFED 2000c). The EWA ASIP can be found in Appendix J.

In this document and the ASIP, special-status species are defined as those threatened, endangered, or rare (in the case of plants) species provided protection under the ESA and the CESA. Also included within the special-status species designation are species of special concern based on factors such as limited distribution; declining population size; diminishing habitat acreage or value; or unusual scientific, recreational, or educational value maintained by federal and state agencies. Legal protection for species of special concern is more limited than listed species, but species of special concern may be added to official lists in the future if the decline of these species continues. Special-status species within the area of analysis and those species considered for evaluation can be found in the EWA ASIP.

The Multi-Species Conservation Strategy (MSCS), which was developed to assist entities implementing CALFED actions with ESA/CESA compliance, identifies 20 NCCP communities (18 habitats and two fish groups). The existing conditions section of this document consistency uses the 18 NCCP habitats for all described regions to

reduce confusion between this Environmental Impact Statement (EIS)/Environmental Impact Report (EIR) and the EWA ASIP. (See Table 10-1.) Using these 18 habitats also provides continuity between the EWA program and other CALFED programs.

The California GAP mapping system¹, which is based on the California Natural Diversity Database (CNDDDB) classification system, and CDFG's Wetland and Riparian Classification, which is based on a combined Cowardin and National Oceanic and Atmospheric Administration (NOAA) C-CAP system² were used to identify habitat types surrounding water transfer facilities. Table 10-1 provides cross-references for the California GAP habitats and MSCS NCCP habitats.

Both the ESA and the NCCPA include provisions for the development of conservation plans to protect vegetation and wildlife resources. The Habitat Conservation Plan (HCP) is designed to offset any harmful effects that a proposed activity might have on a listed species. The HCP process allows development to proceed while promoting listed species conservation. An NCCP "identifies and provides for the regional or area wide protection of plants, animals, and their habitats, while also allowing appropriate development to proceed" (CDFG 2002). There are over 105 HCPs and 15 NCCPs within the State of California that have been approved or are in-progress. Because EWA actions are confined to water transfers or crop idling, the EWA Program would not violate any of these HCP's or NCCP's.

10.1.1 Area of Analysis

EWA actions would affect portions of the Central Valley, the Delta, and, to a limited extent, Southern California. However, these actions would be confined to rivers, reservoirs, and rice croplands upstream from the Delta; the waterways of the Delta; and cotton croplands, canals, and reservoirs in the Export Service Area (areas downstream from the Delta). The area of analysis, shown on Figure 10-1, illustrates the location for each river and water conveyance/storage system addressed in this EIS/EIR.

- The Sacramento River from its terminus in the Delta north to Lake Shasta;
- The Feather River from its intersection with the Sacramento River through Lake Oroville up the South Fork to Little Grass Valley Reservoir;

¹ California Gap Analysis Program (GAP) mapping system. California GAP data under represents wetland and riparian features by using a 40-heactare (ha) (99-acre) minimum mapping unit for wetlands. Most wetland areas within the state are less than 40-ha; and would not be represented on the GAP maps. In order to adequately describe wetland and riparian habitats within the EWA action area, the DFG's Wetland and Riparian Classification maps were also used. California GAP uses a 100-ha (247-acre) minimum mapping unit for upland types (MSCS, 2000).

² Classification of Wetlands and Deepwater Habitats of the United States, (Cowardin *et al.*, 1997) and National Oceanic and Atmospheric Administration Coastal Change Analysis Project (Dobson *et al.*, 1995)

Table 10-1
Crosswalk of MSCS NCCP Habitat Types to Other Community and Habitat Classification Systems

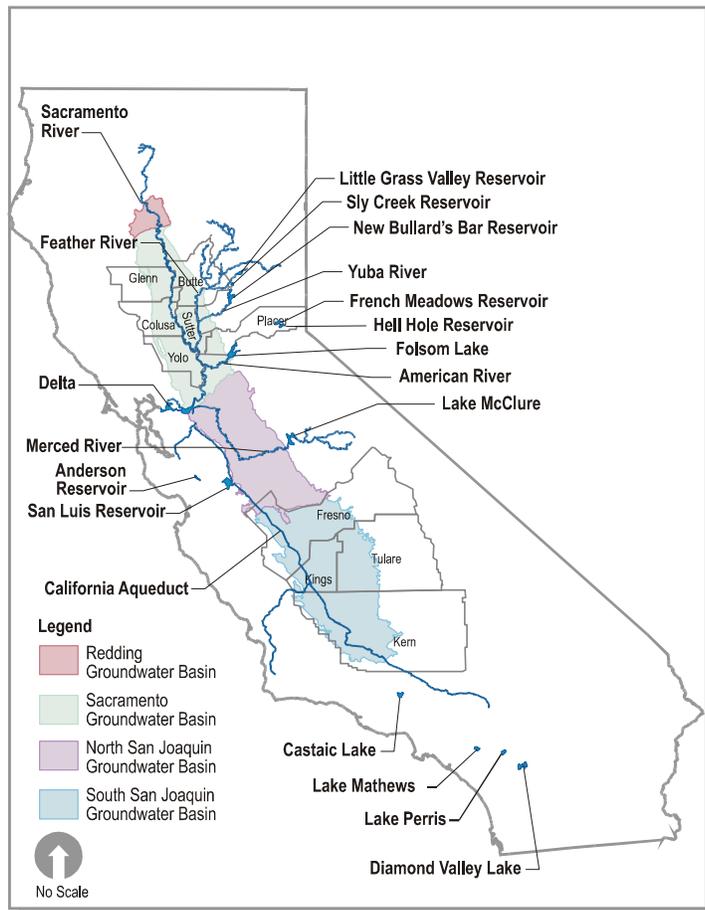
MSCS NCCP Habitat Type	Equivalent Community or Habitat Type Under Other Classification Systems				
	Ecosystem Restoration Program	Wildlife Habitat Relationships ^(a)	Terrestrial Natural Communities of California ^(b)	National Wetland Inventory ^(c)	Department of Water Resources ^(d)
Tidal perennial aquatic	Tidal perennial aquatic, Delta sloughs, and midchannel islands and shoals	Estuarine	None	Estuarine (aquatic subtypes only)	Water surface
Valley riverine aquatic	Riparian and riverine aquatic	Riverine	None	Riverine (aquatic subtypes only)	Water surface
Montane riverine aquatic	Riparian and riverine aquatic	Riverine	None	Riverine (aquatic subtypes only)	Water surface
Lacustrine	Nontidal perennial aquatic	Lacustrine	None	Lacustrine (aquatic subtypes only)	Water surface
Saline emergent	Saline emergent wetland	Saline emergent wetland	Coastal saltmarsh (52100) and coastal brackish marsh (52200)	Estuarine/emergent	Riparian vegetation: marshlands
Tidal freshwater emergent	Fresh emergent wetland, Delta sloughs, and midchannel islands and shoals	Fresh emergent wetland	Coastal and valley freshwater marsh (52410)	Palustrine/emergent/tidal	Riparian vegetation: marshlands
Nontidal freshwater permanent emergent	Fresh emergent wetland	Fresh emergent wetland and wet meadow	Freshwater marsh (52400), alkali marsh (52300), and meadow and seep (45000)	Palustrine/emergent/nontidal/permanent; lacustrine/emergent/permanent; riverine/emergent/permanent	Riparian vegetation: marshlands; riparian vegetation: natural high-water table
Natural seasonal wetland	Seasonal wetlands	Fresh emergent wetland	Vernal pool (44000), vernal marsh (52500) and alkali playa (46000)	Palustrine/emergent/nontidal/seasonal	None
Managed seasonal wetland	Seasonal wetlands	Fresh emergent wetland	Vernal marsh (52500)	Palustrine/emergent/nontidal/seasonal/artificial	Riparian vegetation: duck marsh
Valley/foothill riparian	Riparian and riverine aquatic	Valley foothill riparian	Great Valley riparian forest (61400), sycamore alluvial woodland (62100) and Great Valley riparian scrub (63400)	Estuarine/scrub-shrub, estuarine/forested, palustrine/scrub-shrub, and palustrine/forested	Riparian vegetation: trees and shrubs.
Montane riparian	Riparian and riverine aquatic	Montane riparian	Montane riparian forest (61500) and montane riparian scrub (63500)	Estuarine/scrub-shrub, estuarine/forested, palustrine/scrub-shrub, and palustrine/forested	Riparian vegetation: trees and shrubs.
Grassland	Perennial grassland	Annual grassland and perennial grassland	Valley and foothill grassland (42000)	Upland	Native vegetation: grassland
Inland dune scrub	Inland dune scrub	None	Stabilized interior dunes (23100)	Upland	None

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	Ecosystem Restoration Program	Wildlife Habitat Relationships ^(a)	Terrestrial Natural Communities of California ^(b)	National Wetland Inventory ^(c)	Department of Water Resources ^(d)
Upland scrub	None	Montane chaparral, mixed chaparral, chamise-redshank chaparral, and alkali desert scrub	Great valley chenopod scrub (36200), chaparral (37000), and Diablan sage scrub (32600)	Upland	Native vegetation: light brush, medium brush, and heavy brush
Valley/foothill woodland and forest	None	Valley oak woodland, blue oak woodland, and blue oak-foothill pine	Cismontane woodland (71000), interior live oak forest (81330)	Upland	Native vegetation: brush and timber
Montane woodland and forest	None	Sierran mixed conifer, Douglas-fir, ponderosa pine, aspen, montane hardwood conifer, and montane hardwood	Broadleaved upland forest (81000), upland Douglas fir forest (82420), and Sierran coniferous forest (84200)	Upland	None
Upland cropland	Agricultural lands	Cropland, pasture, and orchard-vineyard	None	Upland	Grain and hay crops, field crops, truck and berry crops, pasture, and idle
Seasonally flooded agriculture	Agricultural lands	Cropland	None	Palustrine/framed	Grain and hay crops, field crops, and rice

Notes: In many cases, the MSCS NCCP habitats do not directly crosswalk to other classifications. NCCP habitats may encompass several habitats from other classifications or only a portion of a habitat from another classification. Habitats from other classifications may encompass several NCCP habitats.

- (a) Mayer, K.E. and W.F. Laundenslayer (eds). 1988. A guide to wildlife habitats of California. California Department of Forestry and Fire Protection. Sacramento, CA.
- (b) Holland, R.F. 1986. Preliminary description of the terrestrial communities of California. California Department of Fish and Game. Sacramento, CA. Numbers in parentheses are Natural Diversity Database element codes corresponding to each community type.
- (c) Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. Washington, D.C.
- (d) California Department of Water Resources. 1993. Land cover mapping program. Sacramento, CA.



**Figure 10-1
Vegetation and Wildlife Area of Analysis**

- The Lost Creek from its juncture with the South Fork of the Feather River to Sly Creek Reservoir;
- The Yuba River from its intersection with the Sacramento River up to New Bullards Bar Reservoir;
- The American River from its intersection with the Sacramento River up through Lakes Natomas and Folsom to Hell Hole and French Meadows Reservoirs;
- The Merced River from its intersection with the San Joaquin River up to Lake McClure;
- The San Joaquin River from its terminus in the Delta to its intersection with the Merced River;
- Other waterways within the legal boundaries of the Delta (as described in California Water Code 12220);
- The California aqueduct and its branches from the Tracy and Banks Pumping Plants to Lake Perris and Castaic Lake;
- MWD's Diamond Valley Lake and Lake Mathews; and
- Santa Clara Valley Water District's Anderson Reservoir.

In addition, the area of analysis extends up to one mile around each river or to the flooding limits of each river whichever is greater. For reservoirs the area of analysis encompasses the reservoir itself and adjacent lands up to ¼ mile away from the reservoir. Also included are all rice and cotton fields being considered for crop idling actions and adjacent lands up to ½ mile surrounding idled fields, and wetlands and riparian habitats associated with groundwater substitution areas.

10.1.2 Upstream from the Delta

The Upstream from the Delta region includes the Sacramento and San Joaquin River watersheds, encompassing most of the Central Valley of California. Fifteen of the 18 counties within the Central Valley contain parts of these two watersheds. The Central Valley contains approximately one-fifth the land area (27,000 square miles) of the state, and once supported a variety of grassland, savannah, riparian, and wetland habitats (Lopez 1996). Today the Central Valley is predominantly agricultural, with rice, orchards, and vineyards in the northern part of the valley and cotton and citrus orchards in the southern part. Undeveloped land in the Central Valley is mostly non-native annual grasslands. However, the Central Valley still includes remnants of native perennial grassland, vernal pool wetlands, riparian, and oak woodland habitats providing the Central Valley with a diversity of habitats, which supports over 827 special-status species (USFWS 2003). The following sections detail the habitats, vegetation³, and wildlife within the Upstream from the Delta Region.

The sections below describe the NCCP habitats within the Upstream from the Delta Region. These descriptions include the dominant vegetation, where each habitat can be found within the area of analysis, and lists of wildlife and special-status species associated with each habitat. Lists of dominant vegetation are based on the California Wildlife Habitat Relationship System; lists of wildlife are based upon searches of available literature; and lists of special-status species are based on MSCS Appendix C and the Ecosystem Restoration Program Plan.

10.1.2.1 Valley Riverine Aquatic

Valley riverine aquatic (VRA) habitat includes the water column of flowing streams and rivers in low-gradient channel reaches below an elevation of approximately 300 feet that are not tidally influenced. This includes associated shaded riverine aquatic (SRA), pool, riffle, run, and unvegetated channel substrate (including seasonally exposed channel bed) habitat features, and sloughs, backwaters, overflow channels, and flood bypasses hydrologically connected to stream and river channels. The following river systems have VRA habitat.

Sacramento River

VRA habitat on the Sacramento River extends from approximately the legal limits of the Delta (Sacramento River at the I Street bridge) to the vicinity of Red Bluff, California (approximately 300 feet above mean sea level [amsl]).

Feather River

VRA habitat on the Feather River extends from the juncture of the Sacramento and Feather Rivers up to Oroville, CA.

³ The California Wildlife Habitat Relationship System (2002) has been used to determine the dominant vegetation and wildlife for each habitat type.

Yuba River

VRA habitat on the Yuba River extends from the juncture of the Feather and Yuba rivers up to approximately Timbuctoo Bend.

American River

VRA habitat on the American River extends from the juncture of the Sacramento and American Rivers to Folsom Lake.

Merced/San Joaquin River

VRA habitat on the Merced River extends from the juncture of the Merced and San Joaquin Rivers to Merced Falls, CA. VRA habitat on the San Joaquin River in the EWA area of analysis extends from the juncture of the Merced and San Joaquin Rivers into the Delta.

10.1.2.1.1 *Vegetation*

The dominant vegetation of valley riverine aquatic habitat includes plankton, water moss, algae, and duckweed.

10.1.2.1.2 *Wildlife*

Aquatic species include riffle insects such as the nymphs of caddisflies, mayflies, alderflies, and stoneflies; pool insects such as dragonflies, damselflies, and water striders; and mollusks, crustaceans, diving beetles, water boatmen. Avian species associated with VRA habitat include waterfowl, wading birds, shorebirds, and raptors. Example species include gulls, terns, herons, kingfisher, swallows, swifts, and flycatchers. Mammal species associated with VRA include river otter, muskrat, and beaver.

10.1.2.1.3 *Special-Status Species*

Special-status animal and plant species associated with VRA include bald eagle, bank swallow, osprey, western pond turtle, California red-legged frog, foothill yellow-legged frog, and eel-grass pondweed.

10.1.2.2 **Montane Riverine Aquatic**

Montane riverine aquatic (MRA) habitat includes the water column of flowing streams and rivers above an elevation of approximately 300 feet. This includes associated SRA, pool, riffle, run, and unvegetated channel substrate (including seasonally exposed channel bed) habitat features, and sloughs, backwaters, and overflow channels hydrologically connected to stream and river channels. The following river systems have developed MRA habitat.

Sacramento River

MRA habitat on the Sacramento River extends from Red Bluff, CA to Lake Shasta.

Feather River

MRA habitat on the Feather River extends between Oroville, CA and Lake Oroville, and then continues from Lake Oroville to Little Grass Valley Reservoir. MRA habitat can also be found along Lost Creek from its juncture with the Feather River to Sly

Creek Reservoir. However, water transfers occurring within this area of analysis would take place through tunnels developed by power companies and not in the natural rivers and creeks.

Yuba River

MRA habitat on the Yuba River in the EWA area of analysis extends from approximately Timbuctoo Bend to New Bullards Bar Reservoir.

American River

MRA habitat on the American River in the EWA area of analysis extends from approximately Folsom Lake to French Meadows Reservoir.

Merced/San Joaquin River

MRA habitat on the Merced River in the EWA area of analysis extends from Merced Falls, CA through Lake McSwain to Lake McClure.

10.1.2.2.1 *Vegetation*

The dominant vegetation for montane riverine aquatic habitat is the same as for valley riverine aquatic (plankton, water moss, algae, and duck weed).

10.1.2.2.2 *Wildlife*

The wildlife associated with montane riverine aquatic habitat is similar to valley riverine aquatic habitat species.

10.1.2.2.3 *Special-Status Species*

Special-status animal and plant species associated with MRA habitats include bald eagle, osprey, western pond turtle, California red-legged frog, foothill yellow-legged frog, California freshwater shrimp, and eel-grass pondweed.

10.1.2.3 **Lacustrine**

Lacustrine habitat is defined as portions of permanent bodies of water that do not support emergent vegetation and that are not subject to tidal exchange, including lakes, ponds, oxbows, gravel pits, and flooded islands.

When water levels are low, exposed shorelines (drawdown zones) are a common feature of reservoirs, and include rocky, sandy, or silty substrates. Aside from ruderal species, these areas are usually devoid of vegetation because of the inundation/desiccation cycle associated with fluctuating reservoir water levels (Entrix 1996). The following river systems have areas of lacustrine habitat.

Sacramento River

Lacustrine habitat along the Sacramento River includes Lake Shasta and Keswick Reservoir. In addition, historical meandering by the Sacramento River has created remnant oxbow and floodplain lakes within the area of analysis.

Feather River

Lacustrine habitat along the Feather River includes Little Grass Valley and Sly Creek Reservoirs, Lake Oroville, and the Thermalito Afterbay. As with the Sacramento

River, historical meandering by the Feather River has created remnant oxbow and floodplain lakes within the area of analysis.

Yuba River

Lacustrine habitat along the Yuba River includes New Bullards Bar Reservoir and Englebright Lake.

American River

Lacustrine habitat along the American River includes French Meadows and Hell Hole Reservoirs and Folsom Lake and Lake Natoma. Historical meandering by the American River has created remnant oxbow and floodplain lakes within the Lower American River area of analysis.

Merced/San Joaquin River

Lacustrine habitat along the Merced and San Joaquin Rivers within the area of analysis includes Lakes McClure and McSwain.

10.1.2.3.1 *Vegetation*

Plankton, water lilies, duckweed, pondweed, and smartweeds are the dominant vegetation for lacustrine habitats.

10.1.2.3.2 *Wildlife*

Lacustrine habitats are used by mammals, birds, reptiles, and amphibians for reproduction, food, water, and cover (Grenfell Jr. 2003). For example, bird species observed foraging over Lake Oroville include the barn swallow, western grebe, and great blue heron.

10.1.2.3.3 *Special-Status Species*

Special-status animal and plant species associated with lacustrine habitats include bald eagle, Aleutian Canada goose, California gull, osprey, western pond turtle, California red-legged frog, and eel-grass pondweed.

10.1.2.4 **Nontidal Freshwater Permanent Emergent**

Nontidal freshwater permanent emergent habitat (NFPE) includes permanent (natural and managed) wetlands, including meadows, dominated by wetland plant species that are not tolerant of saline or brackish conditions. The following river systems have developed areas of NFPE habitat.

Sacramento River

NFPE habitat can be found scattered along the Sacramento River typically in areas with slow moving backwaters. Substantial portions of these habitats occur at the Colusa, Sutter, and Tisdale Bypasses, the Butte Sink, and at the Fremont Weir.

Feather River

NFPE habitat can be found scattered along the Feather River typically in areas with slow moving backwaters. The Oroville Wildlife Area supports this habitat around its quarry ponds. Other areas include the Feather River Wildlife Area.

Yuba River

NFPE habitat can be found scattered along the Feather River typically in areas with slow moving backwaters.

American River

NFPE habitat can be found scattered along the Feather River typically in areas with slow moving backwaters.

Merced/San Joaquin River

NFPE habitat can be found scattered along the Feather River typically in areas with slow moving backwaters. The Dredger Tailings reach supports approximately 28 acres of remnant marsh (approximately half of all remnant marsh in the river corridor) (Stillwater Sciences 2002).

10.1.2.4.1 *Vegetation*

The dominant vegetation for nontidal freshwater permanent emergent includes thingrass, spikerush, big leaf sedge, bulrush, redroot nutgrass, tules, cattails, common reed, and water grass.

10.1.2.4.2 *Wildlife*

Freshwater emergent wetlands are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds and numerous mammals, reptiles, and amphibians (Kramer 2003). Examples of amphibians include bullfrogs, western toads, and Pacific tree frogs. Birds include herons, egrets, bitterns, merganser, wood duck, and yellow warbler.

10.1.2.4.3 *Special-Status Species*

Special-status animal species associated with NFPE habitats include Aleutian Canada goose, American peregrine falcon, black-crowned night heron, black tern, black rail, California gull, greater sandhill crane, long-billed curlew, northern harrier, short-eared owl, snowy egret, tricolored black bird, western least bittern, white-faced ibis, white-tailed kite, giant garter snake, western pond turtle, and California red-legged frog.

Special-status plants include Ferris' milk vetch, bristly sedge, Hispid bird's beak, four-angled spikerush, Delta coyote thistle, rose-mallow, California beaked-rush, Sanford's arrowhead, marsh skullcap, mad-dog skullcap, marsh checkerbloom, and Kenwood marsh checkerbloom.

10.1.2.5 *Natural Seasonal Wetland*

Natural seasonal wetland (NSW) habitat includes vernal pools and other nonmanaged seasonal wetlands with natural hydrologic conditions that are dominated by herbaceous vegetation and that annually pond surface water or maintain saturated soils at the ground surface for enough of the year to support facultative or obligate wetland plant species. Alkaline and saline seasonal wetlands that were not historically part of a tidal regime are included in natural seasonal wetlands.

Sacramento River

NSW habitat can be found scattered along the Sacramento River typically in areas with slow moving backwaters. Substantial portions of these habitats occur at the Colusa, Sutter, and Tisdale Bypasses, the Butte Sink, and at the Fremont Weir.

Feather River

NSW habitat can be found scattered along the Feather River typically in areas with slow moving backwaters.

Yuba River

NSW habitat can be found scattered along the Yuba River typically in areas with slow moving backwaters.

American River

NSW habitat can be found scattered along the American River typically in areas with slow moving backwaters.

Merced/San Joaquin River

NSW habitat can be found scattered along the Merced/San Joaquin River typically in areas with slow moving backwaters.

10.1.2.5.1 *Vegetation*

Dominant natural seasonal wetland vegetation includes big leaf sedge, bulrush, and redroot nutgrass.

10.1.2.5.2 *Wildlife*

Wildlife associated with natural seasonal wetlands are predominantly special-status species. Common species can include ducks, geese, heron, and other waterfowl, wading, and shorebirds.

10.1.2.5.3 *Special-Status Species*

Special-status animal species associated with NSW include American peregrine falcon, California gull, greater sandhill crane, long-billed curlew, northern harrier, short-eared owl, Swainson's hawk, tricolored blackbird, white-tailed kite, giant garter snake, California red-legged frog, California tiger salamander, western spadefoot toad, conservancy fairy shrimp, Delta green ground beetle, longhorn fairy shrimp, mid-valley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Special-status plant species associated with NSW include Henderson's bentgrass, Ferris' milkvetch, alkali milk vetch, heartscale, brittlescale, San Joaquin spearscale, lesser saltscale, succulent owl's clover, Hoover's spurge, Hispid bird's beak, palmate-bracted bird's beak, recurved larkspur, Boggs Lake hedge-hyssop, Ahart's dwarf rush, Contra Costa goldfields, Legenere, Heckard's peppergrass, Butte County meadowfoam, pincushion navarretia, Colusa grass, San Joaquin Valley orcutt grass, hairy orcutt grass, slender orcutt grass, Sacramento orcutt grass, Ahart's paronychia, and Greene's tuctoria.

10.1.2.6 Managed Seasonal Wetland

Managed seasonal wetland (MSW) habitat includes wetlands dominated by native or non-native herbaceous plants, excluding croplands farmed for profit (e.g., corn and rice), that land managers flood and drain during specific periods to enhance habitat values for specific wildlife species. Ditches and drains associated with managed seasonal wetlands are included in this habitat type.

Sacramento River

Managed seasonal wetlands on west side of the Sacramento River generally occur between Willows and Dunnigan, CA along the Colusa Main Drain. Substantial portions of these habitats also occur at the Colusa, Sutter (including the Sutter Bypass Wildlife Area), Tisdale, and Yolo (including the Yolo Bypass Wildlife Area) Bypasses, at the Fremont Weir, and as a part of the Sacramento National Wildlife Refuge Complex (six refuges totaling 35,000 acres).

Feather River

MSW habitat between the Sacramento River and the Feather River generally occur along Butte Creek in the Butte Basin (Upper Butte Basin and Gray Lodge Wildlife Areas), around the Thermalito Afterbay, along the Feather River downstream of Oroville, CA, and along Angel Slough north of Butte City, CA (Llano Seco Rancho Wildlife Area).

Yuba River

MSW habitat generally occurs north of the Yuba River, and around Dry Creek and the Bear River.

Merced/San Joaquin River

MSW habitat along the Merced and San Joaquin Rivers generally occurs just south of the juncture of the two rivers and is described as a part of the Export Service Area.

10.1.2.6.1 Vegetation

Dominant managed seasonal wetland habitats can include the same vegetation as for natural seasonal wetlands.

10.1.2.6.2 Wildlife

MSW habitats are often managed for waterfowl such as mallards, pintails, American widgeon, and Canada and other geese. MSW habitats also support a variety of wading and shorebirds, such as herons, egrets, terns, and gulls.

10.1.2.6.3 Special-Status Species

Special-status animal species associated with MSW include Aleutian Canada goose, American peregrine falcon, bald eagle, black tern, California gull, greater sandhill crane, long-billed curlew, northern harrier, short-eared owl, Swainson's hawk, tricolored blackbird, western snowy plover, white-faced ibis, white-tailed kite, giant garter snake, western pond turtle, California red-legged frog, and vernal pool tadpole shrimp.

Special-status plant species associated with MSW are often the same as those species found in natural seasonal wetlands.

10.1.2.7 Valley/Foothill Riparian

Valley/foothill riparian (VFR) habitat includes all successional stages of woody vegetation, commonly dominated by willow, Fremont cottonwood, valley oak, or sycamore, within the active and historical floodplains of low-gradient reaches of streams and rivers generally below an elevation of 300 feet. The following river systems and their tributaries have developed VFR habitat.

Sacramento River

South of Red Bluff, the Sacramento River enters the Sacramento Valley and transitions into Valley Riverine Aquatic and Valley/Foothill Riparian habitat. Along most of the Sacramento River and its tributaries, remnants of riparian communities are all that remain of once very productive and extensive riparian areas. Between Red Bluff and Chico, the river is mostly unleveed and contains substantial remnants of the Sacramento Valley's riparian forests. One of the most important factors, other than agriculture, affecting riparian habitat downstream of Chico Landing is the Sacramento River Flood Control Project constructed by the US Army Corps of Engineers (Sacramento River Advisory Council 2001). (See Chapter 15, Flood Control, for a more detailed description of the Sacramento River Flood Control Project.) The flood control project has confined riparian vegetation to a narrow band between the river and the riverside of the levees.

Natural areas within this reach include the Redding Arboretum and Kutrass River Access; the largely riparian, Anderson River Park owned by CDFG; the Woodson Bridge State Recreation Area; the Bidwell-Sacramento River State Park; the Colusa-Sacramento River State Recreation Area; and the Sacramento River Wildlife Area.

Feather River

The Oroville Wildlife Area supports VFR habitat and represents the largest acreage of cottonwood forests along the lower Feather River. The Feather River Wildlife Area also supports VFR habitat.

Yuba River

VFR habitat on the Yuba River extends from the juncture of the Sacramento and Yuba Rivers up to approximately Timbuctoo Bend. "Deposition of hydraulic mining debris, subsequent dredge mining, and loss/confinement of the active river corridor and floodplain of the lower Yuba River since the mid-1800's probably eliminated much of the riparian vegetation along the lower Yuba River. However, since completion of New Bullard's Bar Reservoir, higher, more stable flows during the growing season appear to have increased the linear extent of riparian vegetation along the lower Yuba River" (Reclamation 2001).

American River

VFR habitat on the American River extends from the juncture of the Sacramento and American Rivers to Folsom Lake. The U.S. Fish and Wildlife Service (1991b)

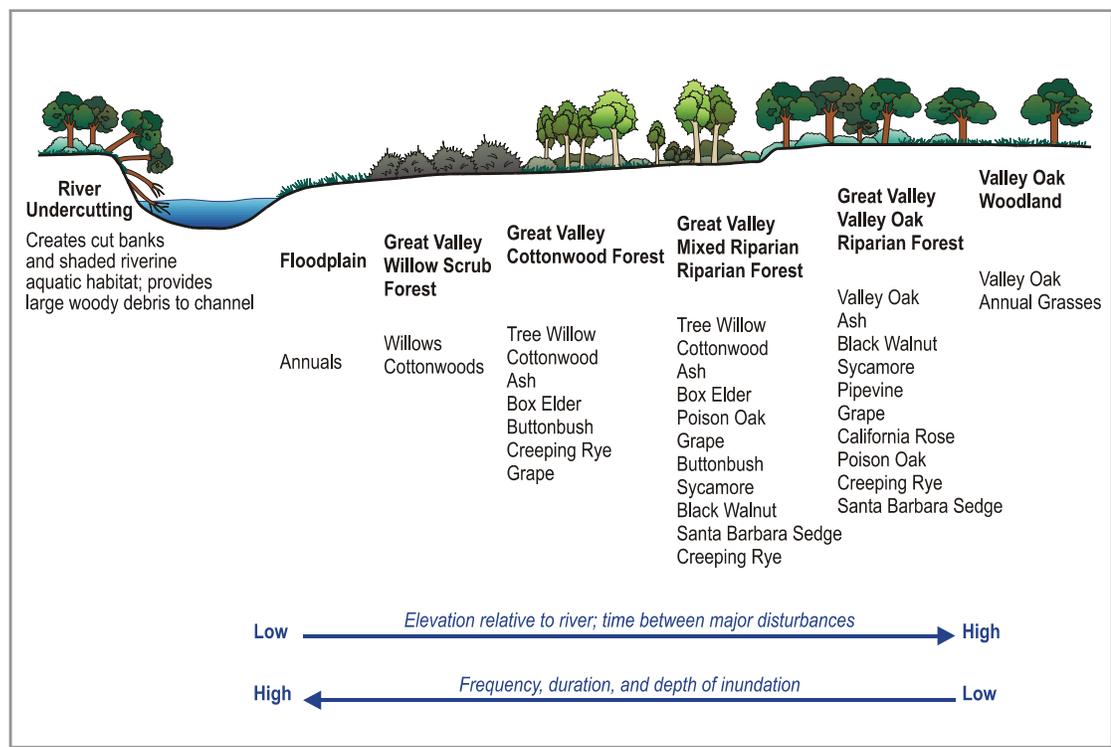
estimated that approximately 3,530 acres of riparian scrub shrub and riparian forest occurs along the American River.

Merced/San Joaquin River

VFR habitat on the Merced River extends from the juncture of the Merced and San Joaquin Rivers to Merced Falls, CA. VFR habitat on the San Joaquin River in the EWA area of analysis extends from the juncture of the Merced and San Joaquin Rivers into the Delta. Approximately 3,928 acres of riparian vegetation currently exist along the Merced River, most within three miles of the confluence with the San Joaquin River. As with all Central Valley Rivers, the Merced River has been affected by agriculture, resource extraction, flow regulation and bank revetment. These actions have altered the hydrology and geomorphology of the river, in turn affecting riparian vegetation. “Consequently, existing mature forest stands along the Merced River may be unsustainable relicts of pre-dam hydrologic regimes” (Stillwater Sciences 2002).

10.1.2.7.1 Vegetation

Riparian forest systems include riparian forest successional stages, gravel bars and bare cut banks, shady vegetated banks, and sheltered wetlands such as sloughs, side channels, and oxbow lakes (Sacramento River Advisory Council 2001). Figure 10-2 shows the typical succession pattern for these communities. Other plant communities found in conjunction with riparian forests include valley oak woodland, wetland, and non-native grassland. Table 10-2 lists vegetation associated with the habitats of river corridors.



**Figure 10-2
Typical Riparian Cross-section**

Table 10-2 River Corridor Habitats and Associated Vegetation			
Riparian Habitat	Common Vegetation	Location	Hydrology
Gravel bars	Willows	Active channel	Frequently inundated throughout the year
Bare cut banks	None	Riverbanks of the active channel	Repeatedly disturbed by elevated winter and spring river flows
Shady vegetated banks	Cottonwoods and willows	Riverbanks of the active channel	Repeatedly disturbed by elevated winter and spring river flows
Sloughs, side channels, oxbow lakes, backwater ponds, and wetlands	Willow, sedge, cattail, bulrush, rush, barnyard grass, slough grass, tules, and lycopus, water primrose, buttonwillow, alder, and cottonwood	Adjacent to the mainstem of a river	Connected to the river by surface water during high winter flood flows and by groundwater during other times of the year.
Willow scrub	Sandbar and other willows, cottonwoods, alder, sycamore, box elder, walnuts, Oregon ash	Point bars near the rivers edge	Repeatedly disturbed by elevated winter and spring river flows
Cottonwood forests	Cottonwood, willow, ash, box elder, buttonwillow, creeping rye, wild grape, poison oak	Narrow belts along the active river channel	Seasonal disturbance by occasional large flows
Mixed riparian forest	Cottonwood, willow, box elder, sycamore, walnut, alder, buttonwillow, blackberry, poison oak, wild grape, creeping rye, Santa Barbara sedge, elderberry	Floodplain terrace	Seasonal disturbance by occasional large flows
Valley Oak Riparian Forest	Valley oak, black walnuts, sycamore, ash, blackberry, wild grape, elderberry, grasses, sedges	Floodplain terrace; Upper terraces composed of fine sediment where soil moisture provides a long growing season	Flooded infrequently
Valley oak woodland	Valley oaks, non-native grasses	Floodplain terrace; Upper terraces composed of fine sediment where soil moisture provides a long growing season	Flooded infrequently at shallow depths
Grassland	Non-native grasses, wild rye	Found on many of the sites within the river corridor; Commonly occurs in areas that have been disturbed by human activity	Occurs in areas that are frequently flooded to those that are only inundated by exceptionally high flows at a shallow depth
Elderberry Savannah	Elderberry, grasses	Adjacent to the floodplain terrace	Only inundated by exceptionally high flows at a shallow depth

Source: SRAC 2001

Riparian plant germination, establishment, growth, and distribution is driven by water availability and floodplain and channel geomorphology. Late winter and early spring high water flows are necessary to clear the river channel of debris and vegetation and unclog sediments. These mobilized bank and riverbed sediments result in the deposition of nutrient-rich sediments on the floodplain. When timed with the release of seeds in the spring, these sediments provide suitable areas for germination of pioneer species such as cottonwood and willow. The low-flow regime, which provides freshly exposed surfaces, is the most important factor for successful seedling establishment and is critical for survival of young trees (Strahan 1985). During the summer and early fall months water availability can determine growth rates and plant types. Inundation may result in the death of young or established

pioneer species through mechanical abrasion or through lack of sufficient soil oxygen; late summer desiccation results in the death of many cottonwood and willow seedlings (Strahan 1985).

Pioneer tree species tend to be shade intolerant and have difficulty growing under a closed canopy. Therefore, other dominant tree species, such as box elder and black walnut, which have the ability to germinate and grow under the cottonwood/willow overstory, begin to succeed the pioneer species. Eventually, oak and sycamore, which are found in old stands on high terraces with the other dominants and along banks high above the river, succeed the intermediate species establishing a later stage successional community (Strahan 1985).

River regulation in California's Central Valley has created artificially stable inter- and intra-annual hydrological conditions that have impaired recruitment and altered the age structure of native riparian tree populations that have evolved with pre-regulation cycles of flooding and summer drought (Stella, et. al. 2003). Changes in hydrology have caused an overall decline in bank erosion rates and an accompanying decrease in point bar formation. Fewer suitable sites for cottonwood and willow forest regeneration are now available, changing the pattern of riparian forest succession. For example, in the absence of river processes on the Lower American River such as new gravel and sand bar formation, and in combination with increased summer flows, cottonwood recruitment has been virtually eliminated and existing stands appear to be aging without opportunities for replacement. Instead alders have increased in abundance by taking advantage of the more consistent summer flows and increased bank stability (USFWS 1991b). On the Sacramento River, controlled flows have resulted in a higher survival percentage through lack of scouring and a continual provision of moisture reducing losses from desiccation (Strahan 1985).

Also affected by changes in hydrology is the inundation frequency along rivers. The frequency of overbank flooding required for natural establishment, maturation, and regeneration of the later stage successional forests continually affects smaller and smaller land areas. According to the Sacramento River Advisory Council (2001), another factor in reduced riparian forests along rivers is conversion of the land to agricultural practices.

10.1.2.7.2 Wildlife

More than 60 percent of all vertebrates spend some portion of their life cycle in riparian habitat (Reclamation and SJRG 1999). In California over 225 species of birds, mammals, reptiles, and amphibians depend on riparian habitats, and cottonwood-willow riparian areas support more breeding avian species than any other comparable broad California habitat type (Sacramento River Advisory Council 2001 and Stillwater Sciences 2002). Riparian areas also serve as a corridor for wildlife movement, providing access to additional seasonal food sources and new territories for dispersing young, and allowing for the movement of individuals into and out of areas, thus ensuring a good mix of genetic material into a population (Sacramento River Advisory Council 2001).

Some of the riparian habitat has a lush canopy with associated shade and cover, which provides habitat for a myriad of insects. Rough ever-sloughing bark of common riparian trees attracts wood-boring larvae and provides forage for bark-gleaning and trunk-scaling birds. Woodpeckers, warblers, flycatchers, and owls are common inhabitants of this habitat. The tall trees also attract wintering and breeding raptors (Reclamation and SJRG 1999). Other wildlife that use riparian habitats include California towhee, Bewick's wren, belted kingfisher, scrub jay, rufous-sided towhee, blue grosbeak, tree swallow, yellow-rumped warbler, lazuli bunting, western tanager, northern oriole, western fence lizard, Pacific tree frog, western toad, bullfrog, western skink, western whiptail, southern alligator lizard, racer, gopher snake, king snake, garter snake, rattlesnake, opossum, black-tailed hair, western gray squirrel, ringtail, river otter, striped skunk, raccoon, beaver, a number of bat species, and mule deer.

10.1.2.7.3 Special-Status Species

Special-status animal species associated with VFR habitat include greater western mastiff bat, ringtail, riparian brush rabbit, San Joaquin Valley woodrat, western yellow-billed cuckoo, bank swallow, bald eagle, black-crowned night heron, California yellow warbler, Cooper's hawk, double-crested cormorant, golden eagle, great blue heron, great egret, least bell's vireo, little willow flycatcher, long-eared owl, osprey, snowy egret, Swainson's hawk, white-tailed kite, yellow-breasted chat, giant garter snake, western pond turtle, California red-legged frog, foothill yellow-legged frog, and valley elderberry longhorn beetle.

Special-status plant species include silky cryptantha, Delta coyote-thistle, marsh checkerbloom, fox sedge, rose-mallow, northern California black walnut, and Sanford's arrowhead.

10.1.2.8 Montane Riparian

Montane riparian (MR) habitat includes all successional stages of woody vegetation, such as willow, black cottonwood, white alder, birch, and dogwood, within the active floodplains of moderate-to-high-gradient reaches of streams and rivers generally above an elevation of 300 feet. The following rivers have developed MR habitat.

Sacramento River

MR habitat occurs along the Sacramento River between Red Bluff, CA and Lake Shasta.

Feather River

MR habitat on the Feather River extends between Oroville, CA and Lake Oroville, and then continues from Lake Oroville to Little Grass Valley Reservoir. MRA habitat can also be found along Lost Creek from its juncture with the Feather River to Sly Creek Reservoir. However, water transfers occurring within this area of analysis would take place through tunnels developed by power companies and not in the natural rivers and creeks.

Yuba River

MR habitat on the Yuba River in the EWA area of analysis extends from approximately Timbuctoo Bend to New Bullards Bar Reservoir.

American River

MR habitat on the American River in the EWA area of analysis extends from approximately Folsom Lake to French Meadows Reservoir.

Merced/San Joaquin River

MR habitat on the Merced River in the EWA area of analysis extends from Merced Falls, CA through Lake McSwain to Lake McClure.

10.1.2.8.1 *Vegetation*

Montane Riparian habitat vegetation is dominated by cottonwood (black and Fremont [at lower altitudes]), white alder, big leaf maple, dogwood, box elder, quaking aspen, wild azalea, water birch, and buttonwillow trees.

10.1.2.8.2 *Wildlife*

As with VFR a wide variety of wildlife is supported by riparian habitats.

10.1.2.8.3 *Special-Status Species*

Special-status species associated with MR habitat include California wolverine, greater western mastiff bat, ringtail, bald eagle, black-crowned night heron, California yellow warbler, Cooper's hawk, double-crested cormorant, great blue heron, great egret, least bell's vireo, little willow flycatcher, long-eared owl, osprey, snowy egret, yellow-breasted chat, California red-legged frog, foothill yellow-legged frog, silky cryptantha, valley elderberry longhorn beetle, and saw-toothed lewisia.

10.1.2.9 *Grassland*

Grassland habitat includes upland vegetation communities dominated by introduced and native annual and perennial grasses and forbs, including non-irrigated and irrigated pasturelands.

Grassland communities in the Central Valley are primarily confined to the western and eastern margins of the valley.

Sacramento River

Grassland habitats can also be found on the north side of Lake Shasta.

Feather River

The Oroville and Feather River Wildlife Areas downstream of Lake Oroville support grassland habitats.

American River

Grassland habitats can be found along portions of the Folsom Lake shoreline.

Merced/San Joaquin Rivers

Grassland habitats can be found around portions of Lakes McClure and McSwain.

10.1.2.9.1 Vegetation

Grasslands in California are dominated by wild oats, soft chess, brome, ryegrass, mustard, foxtail, California oatgrass, hairgrass, sweet vernalgrass, and barley. Common forbs include filaree, clover, popcorn flower, and mullein.

10.1.2.9.2 Wildlife

Grassland wildlife include western fence lizard, common garter snake, western rattlesnake, black-tailed jackrabbit, California ground squirrel, Botta's pocket gopher, harvest mouse, California vole, badger, and coyote. Bird species include western meadowlark, turkey vulture, and American kestrel.

10.1.2.9.3 Special-Status Species

Grassland special-status species include greater western mastiff bat, Merced kangaroo rat, Nelson's antelope ground squirrel, grasshopper sparrow, greater sandhill crane, long-billed curlew, mountain plover, northern harrier, short-eared owl, Swainson's hawk, tricolored black bird, western burrowing owl, white-tailed kite, California horned lark, prairie falcon, San Joaquin whipsnake, California red-legged frog, California tiger salamander, western spadefoot toad, Callippe silverspot, and valley elderberry longhorn beetle.

Grassland special-status plant species include Henderson's bentgrass, Clara Hunt's milk vetch, Jepson's milk-vetch, Ferris' milk-vetch, alkali milk-vetch, heartscale, brittlescale, San Joaquin spearscale, lesser saltscale, Indian Valley brodiaea, beakerd clarkia, silky cryptantha, recurved larkspur, diamond-petaled California poppy, adobe lily, Congdon's tarplant, Brewer's western flax, drymaria-like western flax, red-flowered lotus, Ahart's paronychia, Merced phacelia, Hartweg's golden sunburst, California beaked rush, and Sanford's arrowhead.

10.1.2.10 Upland Scrub

Upland scrub habitat includes habitat areas dominated by shrubs characteristic of coastal scrub, chaparral, and saltbush scrub communities.

Sacramento River

Upland scrub habitat can be found around Lake Shasta and Keswick Reservoir.

Feather River

Mixed chaparral occurs on steep south-facing slopes particularly at Lake Oroville.

Yuba River

Upland scrub habitats surround portions of New Bullards Bar Reservoir.

American River

Upland scrub habitats occur along portions of the Middle and Lower North Forks of the American River and around Folsom Lake.

Merced/San Joaquin River

Upland scrub habitats occur around portions of Lakes McClure and McSwain.

10.1.2.10.1 Vegetation

Upland scrub habitat is dominated by several types of vegetation including, ceanothus, manzanita, bitter cherry, oaks, poison oak, coffee berry, buckbrush, California buckeye, toyon, sugar sumac, chamise, saltbush, sagebrush, and creosote bush.

10.1.2.10.2 Wildlife

Upland scrub habitats support brush rabbit, black-tailed jackrabbit, mule deer, and birds such as rufous-sided towhee, California quail, California thrasher, and red-tailed hawk.

10.1.2.10.3 Special-Status Species

Upland scrub special-status species include greater western mastiff bat, ringtail, golden eagle, Swainson's hawk, prairie falcon, Cooper's hawk, San Joaquin whipsnake, and foothill yellow-legged frog.

Upland scrub special-status plant species include dimorphic snapdragon, Indian Valley brodiaea, dwarf soaproot, Mariposa clarkia, Baker's larkspur, Brandegees' eriastrum, adobe lily, El Dorado bedstraw, Brewer's western flax, drymaria-like western flax, Napa western flax, Tehama county western flax, Parry's horkelia, saw-toothed lewisia, Hall's bush mallow, Mount Diablo phacelia, and Arburua Ranch jewelflower.

10.1.2.11 Valley/Foothill Woodland and Forest

Valley/foothill woodland and forest (VWF) habitat includes nonriparian forest, woodland, and savanna of valleys and foothills.

Sacramento River

VWF habitats are scattered along the Sacramento River often adjacent to VFR habitats. Also, the Woodson Bridge State Recreation Area includes an oak woodland park.

Feather River

Isolated patches of blue oak woodland habitat occur at lower elevations bordering Lake Oroville on south facing slopes. Interior live oak woodlands occur at Lake Oroville on all aspects at elevations below 1,000 feet, and on south-facing slopes at elevations above 1,000 feet. Canyon live oaks occur in protected areas including north-facing slopes, canyons, and along drainages. Extensive mixed oak woodlands occur at elevation above 1,000 feet surrounding Lake Oroville. At elevations below 1,000 feet mixed oak woodlands occur on north and east facing slopes. The Oroville and Feather River Wildlife Areas also support VWF habitat.

Yuba River

VWF habitats are scattered along the Yuba River from Timbuctoo Bend to the Yuba River's juncture with the Feather River.

American River

VWF habitat is scattered along lower portions of American River and along portions of the Folsom Lake shoreline.

Merced/San Joaquin River

VWF habitats occur around portions of Lakes McClure and McSwain.

10.1.2.11.1 *Vegetation*

Valley/Foothill woodland and forest habitat is often dominated by sycamore, black walnut, foothill pine, valley oak, live oak, juniper, blue oak, interior live oak, coast live oak, and California buckeye.

10.1.2.11.2 *Wildlife*

VFW habitat supports a variety of wildlife, including: acorn woodpecker, northern flicker, wild turkey, plain titmouse, black-tailed jackrabbit, American crow, California quail, Bewick's wren, western fence lizard, coyote, mule deer, California ground squirrel, western gray squirrel, scrub jay, beaver, river otter, muskrat, skunk, raccoon, wood ducks, pheasant, Nutall's woodpecker, western wood pewee, hermit thrush, yellow-billed magpies, gopher snake, common kingsnake, and western rattlesnake.

10.1.2.11.3 *Special-Status Species*

VWF special-status species include greater western mastiff bat, ringtail, Cooper's hawk, long-eared owl, osprey, Swainson's hawk, bald eagle, white-tailed kite, golden eagle, and northern goshawk.

VWF special-status plant species include dimorphic snapdragon, Clara Hunt's milk-vetch, Jepson's milk-vetch, Mariposa clarkia, Shasta clarkia, beaked clarkia, silky cryptantha, recurved larkspur, Brandegees' eriastrum, adobe lily, El Dorado bedstraw, Congdon's tarplant, Brewer's western flax, drymaria-like western flax, Napa western flax, Tehama County western flax, Parry's horkelia, Mt. Tedoc linanthus, Madera linanthus, red-flowered lotus, Ahart's paronychia, thread-leaved beardtongue, Mt. Diablo phacelia, and Hartweg's golden sunburst.

10.1.2.12 **Montane Woodland and Forest**

Montane woodland and forest (MWF) habitat includes nonriparian forest and woodland above the foothills.

Sacramento River

MWF can be found around portions of Lake Shasta and Keswick Reservoir.

Feather River

MWF can be found around portions of Little Grass Valley and Sly Creek Reservoirs and Lake Oroville.

Yuba River

MWF can be found around portions of New Bullard's Bar Reservoir.

American River

MWF can be found around portions of French Meadows and Hell Hole Reservoirs and the northern shores of Folsom Lake.

10.1.2.12.1 *Vegetation*

Montane woodland and forest vegetation is dominated by white fir, Douglas fir, ponderosa pine, Jeffery pine, red fir, lodgepole pine, sugar pine, live oak, tanoak, incense cedar, coulter pine, willows, alders, black cottonwood, aspens, black oak, and knobcone pine.

10.1.2.12.2 *Wildlife*

Wildlife associated with MWF includes: western tanager, white-breasted nuthatch, woodpeckers, mule deer, bobcat, mountain lion, raccoon, striped skunk, black bear, beaver, marmot, chipmunk, coyote, fisher, pine martin, and weasel.

10.1.2.12.3 *Special-Status Species*

MWF special-status animal species include California wolverine, greater western mastiff bat, ringtail, bald eagle, Cooper's hawk, northern spotted owl, and osprey.

Special-status plant species include Indian Valley brodiaea, silky cryptantha, drymaria-like western flax, saw-toothed lewisia, Mount Tedoc linanthus, Madera linanthus, thread leaved beardtongue, California beaked-rush, and marsh skullcap.

10.1.2.13 **Upland Cropland**

Upland cropland habitat includes agricultural lands farmed for grain field, truck, and other crops for profit that are not seasonally flooded.

Upland cropland areas are found throughout the Sacramento Valley. However, EWA water acquisition actions will only involve cotton fields in the San Joaquin Valley.

10.1.2.13.1 *Vegetation*

Upland cropland vegetation is dominated by cereal rye, barley, wheat, corn, dry beans, safflower, alfalfa, cotton, tomatoes, lettuce, Bermuda grass, ryegrass, tall fescue, almonds, walnuts, peaches, plums, and grapes.

10.1.2.13.2 *Wildlife*

Wildlife use of these areas varies throughout the growing season with crop type, level of disturbance, and available cover. Orchard and vineyard typically support resident species, such as scrub jay, northern mockingbird, yellow-billed magpie, American crow, and northern flicker. During the winter, orchard habitats provide foraging habitat and roosting sites for many songbirds species including the white-crowned sparrow, dark-eyed junco, golden-crowned sparrow, lesser goldfinch, and yellow-rumped warbler. Species associated with field and row crops include the red-winged blackbird, European starling, western meadowlark, California vole, black-tailed jackrabbit, western harvest mouse, Botta's pocket gopher, raccoon, striped skunk, and Virginia opossum. Croplands provide foraging habitat for many raptors including the northern harrier, red-tailed hawk, and white-tailed kite.

10.1.2.13.3 *Special-Status Species*

Upland cropland special-status species includes San Joaquin kit fox, Aleutian Canada goose, California gull, greater sandhill crane, long-billed curlew, mountain plover, northern harrier, Swainson's hawk, tricolored blackbird, western burrowing owl, white-faced ibis, and white-tailed kite.

10.1.2.14 **Seasonally Flooded Agriculture**

Seasonally flooded agricultural land habitat includes agricultural lands farmed for grain, rice, field, truck, and other crops for profit that require seasonal flooding for at least one week at a time as a management practice (e.g., for pest control and irrigation) or are purposely flooded seasonally to enhance habitat values for specific wildlife species (e.g., ducks for duck clubs). Agricultural ditches and drains associated with maintaining seasonally flooded agricultural land are included in this habitat type.

Seasonally flooded agriculture is found throughout the Sacramento Valley. However, currently the EWA agencies are only considering idling up to 89,608 acres of rice crop in six counties (Glenn, Colusa, Butte, Sutter, Placer, and Yolo). These counties typically harvest about 496,820 acres of rice (USDA 2002). For more information on crop idling within these counties refer to Section 2.4.2.1.3.

10.1.2.14.1 *Vegetation*

For the purposes of the EWA program, EWA actions affecting seasonally flooded agriculture will be focused on rice fields.

10.1.2.14.2 *Wildlife*

- Rice fields provide important foraging habitat for a variety of wildlife species. (See examples in Table 10-3 and Figure 10-3.) Many species forage on post-harvest waste grain (on average 300-350 pounds per acre depending upon harvest method) and other food found within the fields (more than 250 pounds per acre), such as duckweed, fish, and crayfish and other invertebrates (Brouder and Hill 1995). Typically various birds and rodents consume rice waste grain and then raptors feed on the birds and rodents. Duckweed and other moist soil plants can provide high quality food for waterfowl. Water level manipulations are necessary for moist soil plant germination and maturity. Fish are often entrained in the irrigation canals that supply water to the rice fields. Crayfish are found in the canal banks and berms of the rice fields. Simply continuing to pump water through the canals will ensure some level of fish and crayfish abundance for wildlife such as herons, cranes, egrets, etc.



Figure 10-3
Great Blue Heron Using Flooded Rice Field

Source: California Department of Fish and Game

Table 10-3
Wildlife, Including Special-Status Species, Associated with Rice Fields¹
(Note: This list is not exhaustive.)

Species	Scientific Name	Status ²
Amphibians		
Western Spadefoot	<i>Scaphiopus hammondi</i>	CSC
Reptiles		
Western Pond Turtle	<i>Clemmys marmorata</i>	CSC
Giant Garter Snake*	<i>Thamnophis gigas</i>	FT, ST
Birds		
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	CSC
American Bittern*	<i>Botaurus lentiginosus</i>	FSC
Great Egret	<i>Casmerodius albus</i>	CSC
Snowy Egret	<i>Egretta thula</i>	CSC
White-faced Ibis	<i>Plegadis chihi</i>	CSC
Aleutian Canada Goose	<i>Branta canadensis leucopareia</i>	Delisted
White-tailed Kite	<i>Elanus leucurus</i>	FSC, FP
Bald Eagle	<i>Haliaeetus leucocephalus</i>	FT, PR, SE, FP
Northern Harrier*	<i>Circus cyaneus</i>	CSC
Swainson's Hawk	<i>Buteo swainsoni</i>	ST
Ferruginous Hawk	<i>Buteo regalis</i>	CSC
Golden Eagle	<i>Aquila chrysaetos</i>	PR, CSC, FP
Merlin	<i>Falco columbaris</i>	CSC
Peregrine Falcon	<i>Falco peregrinus</i>	SE, FP
Prairie Falcon	<i>Falco mexicanus</i>	CSC
Greater Sandhill Crane	<i>Grus canadensis tabida</i>	ST, FP
Mountain Plover	<i>Charadrius montanus</i>	PT, FSC, CSC
Long-billed Curlew	<i>Numenius americanus</i>	CSC
Black Tern*	<i>Chlidonias niger</i>	CSC
Burrowing Owl*	<i>Speotyto cunicularia</i>	CSC
Long-eared Owl	<i>Asio otus</i>	CSC
Short-eared Owl*	<i>Asio flammeus</i>	CSC
Bank Swallow	<i>Riparia riparia</i>	ST
Bewick's Wren	<i>Thryomanes bewickii</i>	FSC
Loggerhead Shrike	<i>Lanius ludovicianus</i>	CSC
Lark Sparrow	<i>Chondestes grammacus</i>	FSC
Tricolored Blackbird*	<i>Agelaius tricolor</i>	CSC
California Gull	<i>Larus californicus</i>	CSC
Pheasant	<i>Phasianus colchicus</i>	-
Black-necked Stilt	<i>Himantopus mexicanus</i>	-
American Avocet	<i>Recurvirostra americana</i>	-
Mallard*	<i>Anas platyrhynchos</i>	-
Gadwall	<i>Anas strepera</i>	-
Cinnamon Teal	<i>Anas cyanoptera</i>	-
Northern Shoveler	<i>Anas clypeata</i>	-
Northern Pintail	<i>Anas acuta</i>	-
Ruddy Duck	<i>Oxyura jamaicensis</i>	-
Wood Duck	<i>Aix sponsa</i>	-
Redhead	<i>Aythya americana</i>	-
Virginia Rail	<i>Rallus limicola</i>	-
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	CSC
Great Blue Heron	<i>Ardea herodias</i>	CSC
White-fronted goose	<i>Anser albifrons</i>	-
Canada Goose	<i>Branta canadensis</i>	-
Tundra Swan	<i>Cygnus columbianus</i>	-

Table 10-3 (continued)		
Wildlife, Including Special-Status Species, Associated with Rice Fields¹		
<small>(Note: This list is not exhaustive.)</small>		
Species	Scientific Name	Status²
Mammals		
Raccoon	<i>Procyon lotor</i>	-
Opossum	<i>Didelphis virginiana</i>	-
River Otter	<i>Lutra canadensis</i>	-
Beaver	<i>Castor canadensis</i>	-
Muskrat	<i>Ondatra zibethicus</i>	-

¹ RMI 1997 and CALFED 1998.

² Status Codes

FE = Listed as Endangered under ESA

FT = Listed as Threatened under ESA

PT = Proposed for listing as Threatened under ESA

FSC = Federal species of management concern

PR = Protected under the Bald and Golden Eagle Protection Act

SE = Listed as Endangered under CESA

ST = Listed as Threatened under CESA

FP = Fully protected under California Fish and Game Code

CSC = California Department of Fish and Game "species of special concern"

* = Species breeds or in some manner uses rice cultural habitats for successful reproduction.

Other invertebrates and their larvae can be found in very shallow water particularly during an early to midseason drawdown. These invertebrates, such as bloodworms, are particularly important to shorebirds.

Rice also provides resting, nesting, and breeding habitat similar to natural wetlands. Irrigation ditches can contain wetland vegetation such as cattails, which provide cover habitat for rails, egrets, herons, bitterns, marsh wrens, sparrows, and common yellowthroats. Rice fields provide pair, brood, and nesting habitat for species such as the mallard, northern pintail, and black tern. Both the Waterfowl and Special-Status Species section below provide more information on the association between rice and these wildlife categories.

Waterfowl

Although the extent of wetlands that once existed isn't precisely known, it is estimated that within the last 100 years, 95 percent of the Central Valley wetlands have been converted to cropland or other anthropogenic uses. Of the remaining 383,000 acres of wetlands left in the Central Valley, 2/3 are privately owned; the remaining 1/3 is divided between state wildlife management areas and federal National Wildlife Refuges (Harrell et. al. 1995). Because of the loss of wetland habitat, wintering waterfowl populations have been reduced to between three and five million (RMI 1997). With the continued loss of wetlands, waterfowl within the Sacramento Valley have become increasingly dependent upon managed seasonally flooded wetlands and agricultural lands, including rice fields, for food and cover. Despite the reduced waterfowl numbers, the Central Valley supports 250 species of birds that includes 60 percent of all wintering waterfowl on the Pacific Flyway. Waterfowl supported by the Central Valley fall into four groups:

- **Permanent residents** - These are primarily breeding ducks, such as mallard ducks, cinnamon teal, gadwell and wood ducks. For successful breeding, "pair",

upland nesting areas, and “brood water” habitats are needed. “Pair” water consists of shallow water (4-12 inches deep) in wetlands, ditches, or small ponds that are adjacent to upland nesting fields. These areas have good invertebrate populations that are believed to be the primary food source of pre-laying hens. Breeding ducks begin establishing territories and accumulating fat and protein reserves between February and May prior to nesting (Smith 1995). Nesting occurs in adjacent uplands. Once the young have fledged, “brood water” is needed to support the hen and ducklings. Spring and summer wetlands can serve as suitable brood water providing these wetlands have a sufficient quantity of invertebrate foods, contain vegetative cover for protection from predators, and are located near upland nesting sites. Spring/summer wetlands that are flooded for part of the year (such as rice fields/duck hunting sites) can provide good duck brood habitat. Wild rice, which is typically planted and flooded in late March, may be especially important as early brood habitat.

- **Winter residents** – These include the greater and lesser sandhill crane (often included with waterfowl because of their closely associated life history requirements), white geese (snow and Ross’), cackling Canada geese, and various species of ducks. Of the wintering ducks, the northern pintail is the most abundant with a winter population of approximately 1.6 million birds. The mallard duck is the next most abundant. Other ducks include the American widgeon, northern shoveler, green-winged teal, gadwell, cinnamon teal, ruddy duck, and canvasback ducks. Winter residents migrate to the Central Valley during the fall (September – November) and depart in spring (March – May) for their summer breeding grounds. Wintering waterfowl tend to use shallow marshes, agricultural fields such as rice, some uplands, and open lakes.
- **Summer Residents** – The cinnamon teal is an example of a summer resident duck of the Central Valley. It begins to arrive in the Central Valley in mid-February to establish territories. Other marsh dwellers begin to arrive in mid-March with yet another wave of species arriving in late May. Summer residents depart the Valley for their wintering grounds in the fall (Engilis 1995).
- **Transient Residents** – Transients residents pass through the Central Valley in March through May and/or August through October while en route to their winter or summer grounds.

To guide management and conservation efforts, research has been conducted to determine habitat usage and foraging behavior by wintering waterfowl. The results of these studies indicate that within the Sacramento Valley, waterfowl used flooded rice fields differently than semi-natural wetlands for both foraging and cover (Elphick et. al. 1996). Birds tended to use dry fields in the early fall when flooded fields were not available and in late winter (February) in the absence of rain-filled fields. (Miller and Newton 1999) Some habitats are used at night to provide food for certain species (such as the green winged teal) but these same habitats only provide thermal cover or protection from nocturnal predators for others (wood ducks, mallards). All studies

indicate that diverse habitats are required/optimal to provide needed uses of all wintering species.

Migrating waterfowl that begin arriving in August depend on food from both the managed wetlands and flooded rice fields. The elimination of historic wetlands within the Sacramento Valley has resulted in rice seed becoming an increasingly essential food in the diet of migrating waterfowl residents. Rice is a particularly important food for green-winged teal, pintail, widgeon and mallard-ducks; white-fronted, Canada, snow and Ross' geese. Critical periods of energy expenditure for individual wintering pintails within the Sacramento Valley determined for a dry and wet year were found to include the early fall period from August through November when rapidly increasing daily energy was required from food (DER_{food}); a period of lowered DER_{food} and increased daily energy required from body reserves (DER_{reserves}) during late winter (January and February when food availability is diminished); and a period when daily energy expenditure (DEE) and DER_{food} decreased somewhat during February and March of the wet year (Miller and Newton 1999). In the dry year monitored, DER_{reserves} increased in February and March. The greatest population demand for food occurred in December and January when pintails were most abundant and body mass was low or moderate.

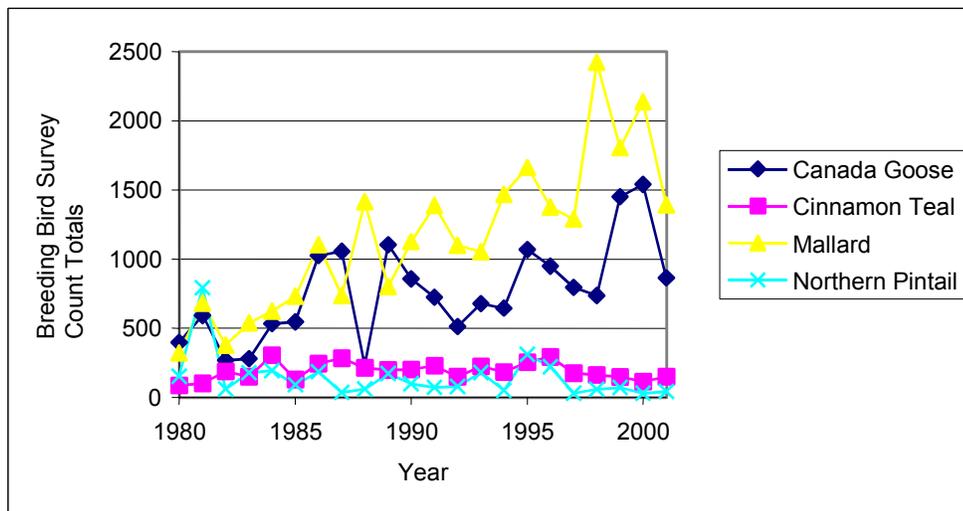
Types of foods that were consumed during these critical periods were investigated in other studies of fall and winter foods consumed by northern pintails overwintering in the Sacramento Valley (Miller 1987 and Miller and Newton 1999). In addition to rice seed from unharvested refuge wetlands, seeds available included swamp timothy, barnyard grass, flat sedges, and smartweeds. Marsh seeds were used intensively in the fall, but rice seed was still a dominant factor in pintail foraging routines. Rice, although high in carbohydrates, lacks essential nutrients that include the proper complements of amino acids, fatty acids, minerals and vitamins in natural marsh seeds that are crucial to survival and reproduction of waterfowl. However, rice fields serve as a supplement when marsh seeds are not available.

After arriving in the Sacramento valley, waterfowl feed exclusively on vegetation. As the winter progresses, vegetation intake was found to decrease while invertebrate intake increased in mid-winter and reached as high as 65 to 70 percent of daily intake in late winter. Flooded-harvested rice fields on the wildlife refuges were excellent sources of midge larvae in late winter. Ponds on private lands, however, are normally drained in mid-January following the last day of hunting season, which eliminates roosting space and productive invertebrate feeding areas. Midges, for example, die within 10 days of drainage. The invertebrates provide dietary protein that may be required several weeks prior to rapid growth of reproductive organs, and therefore late winter consumption of invertebrates may directly affect reproductive performance. Protein is also needed for the mid-winter molt and egg laying process. Pintails were found to roost on flooded rice fields more frequently as the winter progressed where they increasingly relied on night feeding of rice seeds and invertebrates.

Relatively recent methods of straw management have begun to affect the food available to wintering waterfowl on rice fields. These methods, that include flooding and wet rolling, straw chopping and incorporation through discing or other means, and straw removal, have replaced burning as the primary means of straw disposal. This change was brought about as a result of the Rice Straw Burning Reduction Act (AB 1378) passed by the California legislature in 1991 that restricted burning due to concerns over air quality in Northern California (Brouder and Hill 1995). Straw removal/disposal off-site, which is not economical due to poorly developed market options), and traditional straw cutting and discing drastically decreases the amount of residual rice seed and optimal habitat available to waterfowl. Shallow flooding and wet rolling, however, which results in waste rice seed floating on shallow floodwaters, preserves residual rice seed as a carbohydrate source and creates winter habitat that fosters growth of important invertebrate species needed for reproductive success (Brouder and Hill 1995).

Research has shown that after harvest, and before burning (the method traditionally used to dispose of rice straw residue), there was an average of 260 pounds of rice per acre lay on the ground an additional 86 pounds per acre on the straw stubble (Brouder and Hill 1995). These figures were generated from fields on which the rice was harvesting using conventional cutter-bar technology common in the 1980's, which cuts the rice stalks and leaves the stubble. In the 1990's with the advent of stripper headers, which strips seeds off of the seed heads but leaves the rice stalk standing, an average of 260 pounds of rice per acre lay directly on the ground, but only 46 pounds of rice per acre remained on the straw. In addition, rice fields provide approximately 250 pounds per acre of naturally occurring food sources such as small invertebrates, tubers, edible shoots, and seeds. From these figures, it appears that rice fields managed as wetlands can provide almost 600 pounds per acre, which is approximately 80 percent of the food found in natural wetlands (Brouder and Hill 1995).

As stated above, the abundance of waterfowl in the Central Valley has greatly declined from historic numbers. Since the late 1870's, waterfowl wintering in the Central Valley has declined dramatically, due to a variety of reasons that include extended periods of drought on northern breeding grounds and associated decline in suitable nesting habitat, and loss of wetlands in the Central Valley wintering grounds. Concern over loss of wetland habitat peaked when, in 1981, the relationship between winter habitat quantity and quality and hunter success was demonstrated. The discovery of large successful nesting populations in the Central Valley and recognition that duck hunting was better on well managed wetlands than flooded rice fields increased interest in private wetland management in the 1980's. Through efforts of waterfowl conservation groups, proactive management of both breeding and winter waterfowl habitats by the US and Canadian governments, California waterfowl population began to change so that by the early 1990's, numbers began increasing for many species (RMI 1997). (See Figure 10-4.)



Source: Sauer, J. R., et. al..

Figure 10-4
Breeding Bird Survey Results 1980-2001

The USFWS report on trends in duck breeding populations within the traditional survey area (primarily western and central U.S. and Canada) over the period from 1955 through 2001 indicates that the 2001 population estimates for ducks, blue winged teal, gadwalls, green winged teal, and northern shovelers all exceed historical average population figures. Mallards, widgeons, redheads and canvasbacks 2001 populations are approximately equal to historical averages. Pintail and scaup numbers, however, are below historic average population figures (Wilkins et. al. 2001). The pintail population, which has steadily fallen beginning in 1970 (6.4 million), began to increase by the mid-1990's, but the 2001 estimate of 3.3 million is still significantly less than the early 1970 averages (RMI 1997).

10.1.2.14.3 Special-Status Species

Certain special-status species rely on, to varying degrees, seasonally flooded agricultural lands, in particular rice fields and their associated uplands, drainage ditches, irrigation canals, and dikes. Detailed species accounts for species of concern to EWA agencies can be found in Appendix J, the EWA ASIP. The relationship between these species and rice production in the Sacramento Valley is described in Table 10-7, Section 10.2.6.1.7. Figure 10-5 provides a brief overview of the rice production cycle.

10.1.3 Delta Region

The Delta Region encompasses the legal limits of the Delta as described in California Water Code Section 12220. Figure 3-3 in Chapter 3 shows the Delta Region and its facilities. Each NCCP Community was described at a general level of detail in the Upstream from the Delta Region. This section will detail the existing conditions as they apply to the EWA area of analysis within the Delta Region. Some habitats occur in the Upstream from the Delta Region and in the Delta Region. Habitat descriptions for those habitats can be found in Section 10.1.2, Upstream from the Delta Region. The Delta Region sections for these habitats will simply include the habitat location and associated wildlife and special-status species.

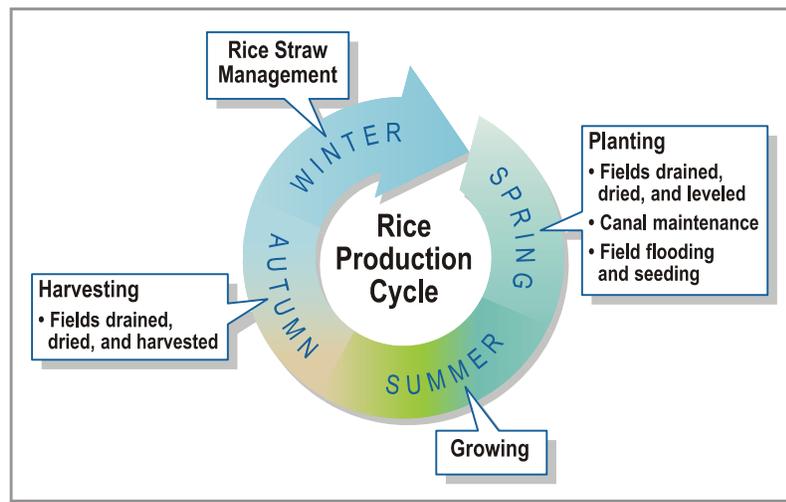


Figure 10-5
Rice Production Cycle

The Sacramento, San Joaquin, and other rivers, join in the Delta and flow westward into Suisun and San Pablo bays, and ultimately, reach the San Francisco Bay. Today, the Delta Region contains about 641,000 acres of agricultural land (72 percent of the total land area) that dominate its lowland areas. Other dominant habitats in the region include valley foothill riparian and fresh and saline emergent wetlands. Although less prominent, other important habitats include seasonal fresh-water wetlands and nontidal freshwater, tidal freshwater, and brackish water emergent marsh. Hundreds of miles of waterways divide the Delta Region into islands, some of which are below sea level. The Delta Region relies on more than 1,000 miles of levees to protect these islands. Suisun marsh represents over ten percent of the remaining wetlands in California and is one of the largest contiguous marshlands in the U.S. (Entrix 1996).

10.1.3.1 Tidal Perennial Aquatic

Tidal perennial aquatic (TPA) habitat is defined as deepwater aquatic (greater than 3 meters deep from mean low lowtide), shallow aquatic (less than or equal to 3 meters deep from mean low lowtide), and unvegetated intertidal (tideflats) zones of estuarine bays, river channels, and sloughs.

Tidal perennial aquatic habitat within the Delta occurs in open water including sloughs and channels in the Delta, and bays. Deep open-water areas are largely unvegetated; beds of aquatic plants occasionally occur in shallower open-water areas.

10.1.3.1.1 *Vegetation*

TPA habitats are largely unvegetated.

10.1.3.1.2 *Wildlife*

Tidal perennial aquatic habitat is used as foraging and resting habitat and escape cover for shorebirds, wading birds, and waterfowl. Double-crested cormorant, California gull, ring-billed gull, herring gull, migrating waterfowl such as canvasback, red head, ring-necked duck, greater scaup, lesser scaup, common golden eye, and bufflehead.

10.1.3.1.3 *Special-Status Species*

Special-status wildlife species associated with TPA habitat include: Aleutian Canada goose, American peregrine falcon, bald eagle, California brown pelican, western snowy plover, California least tern, California gull, long-billed curlew, and osprey.

10.1.3.2 **Valley Riverine Aquatic**

Delta VRA habitat includes the Sacramento, San Joaquin, Consumnes, Mokelumne, and Calaveras rivers; and sloughs, streams, and ephemeral creeks. Major waterways in Suisun Bay and Marsh area include Suisun, Montezuma, and Nurse sloughs. River channels and sloughs associated with the Sacramento and San Joaquin Rivers.

10.1.3.2.1 *Wildlife*

Many species rely on riverine habitat and the associated adjacent habitats. Bird species, including herons, shorebirds, and songbirds commonly forage in this habitat. Amphibians, such as newts and frogs are closely associated with the riverine environment. Also, several mammal species are linked to river habitats including the river otter, mink, muskrat, and beaver.

10.1.3.2.2 *Special-Status Species*

Special-status species associated with VRA include bald eagle, bank swallow, osprey, western pond turtle, California red-legged frog, foothill yellow-legged frog, and eel-grass pondweed.

10.1.3.3 **Lacustrine**

Lacustrine habitats such as dead end sloughs, forebays, and flooded islands can be found throughout the Delta.

10.1.3.3.1 *Wildlife*

This habitat provides foraging habitat for a variety of wildlife species including fish-eating birds such as terns, grebes, cormorants, herons, and waterfowl. In addition, it provides habitat for beaver, river otter, and muskrat.

10.1.3.3.2 Special-Status Species

Special-status species associated with lacustrine habitats include bald eagle, Aleutian Canada goose, California gull, osprey, western pond turtle, California red-legged frog, California tiger salamander, and eel-grass pondweed.

10.1.3.4 Saline Emergent

Saline emergent habitat includes the portions of San Francisco, San Pablo, and Suisun Bays and the Delta that support emergent wetland plant species that are tolerant of saline or brackish conditions within the intertidal zone or on lands that historically were subject to tidal exchange (diked wetlands).

The dominant vegetation for saline emergent habitats includes cordgrass, pickleweed, bulrush, glasswort, saltwort, saltgrass, arrowgrass, seablite, hairgrass, cattail, common reed, and algae.

10.1.3.4.1 Wildlife

More than 25 species of birds and mammals used saline emergent wetlands (CALFED 2000a). Examples include herons, egrets, ducks, hawks, and a variety of rodents.

10.1.3.4.2 Special-Status Species

Special-status animal species associated with saline emergent habitats includes salt marsh harvest mouse, San Pablo California vole, Suisun ornate shrew, Aleutian Canada goose, American peregrine falcon, California black rail, California clapper rail, California gull, long-billed curlew, northern harrier, saltmarsh common yellowthroat, San Pablo song sparrow, short-eared owl, Suisun song sparrow, white-tailed kite, Suisun marsh aster, Suisun thistle, soft bird's beak, Delta tule pea, Marin knotweed, and California seablite. Other species include saltmarsh wandering shrew, California least tern, black-crowned night heron, great blue heron, snowy egret, great egret, and marsh wren.

Special-status plant species include Ferris' milkvetch, palmate-bracted bird's beak, narrow-leaf gumplant, heartscale, San Joaquin spearscale, crownscale, brittlescale, Delta button celery, hairy bird's beak, Mason's lilaepsis, bristly sedge, rose-mallow, mad-dog skullcap, Delta mudwort, and Delta coyote-thistle.

10.1.3.5 Tidal Freshwater Emergent

Tidal freshwater emergent habitat includes portions of the intertidal zones of the Delta that support emergent wetland plant species that are not tolerant of saline or brackish conditions.

Tidal fresh-water and brackish-water emergent marsh habitat occurs on in-stream islands and along mostly unveeved, tidally influenced waterways. Tidal emergent marsh provides habitat for many special-status species. The Suisun Marsh is the largest contiguous brackish water wetland in California (USFWS 2000).

The dominant vegetation for tidal freshwater emergent habitat includes California, river, and big bulrush, tules, cattails, and common reed.

10.1.3.5.1 Wildlife

Freshwater emergent wetlands are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds and numerous mammals, reptiles, and amphibians (Kramer 2003). The Suisun Marsh is a critical resource for wintering waterfowl providing resting, and feeding habitat for up to 28 percent of the waterfowl along the Pacific Flyway during the autumn in low rainfall years (Entrix 1996). Approximately 200 species of birds, 45 species of mammals, and 36 species of amphibians and reptiles inhabit the Suisun Marsh environs (USFWS 2000). Over 50 species of birds, mammals, reptiles, and amphibians use freshwater emergent wetlands in the Delta (CALFED 2000a).

10.1.3.5.2 Special-Status Species

Special-status animal species includes: Suisun ornate shrew, salt marsh common yellowthroat, giant garter snake, Aleutian Canada goose, bald eagle, peregrine falcon, black tern, black rail, California clapper rail, California gull, long-billed curlew, northern harrier, short-eared owl, Suisun song sparrow, white-faced ibis, and white-tailed kite.

Special-status plant species of Suisun Bay include Suisun Marsh aster, Antioch Dunes evening primrose, Carquinez golden bush, Contra Costa goldfields, Delta tule pea, Delta mudwort, brittlescale, Valley spearscale, Suisun thistle, soft bird's-beak, Contra Costa wallflower, Mason's lilaepsis, California hibiscus, bristly sedge, Jepson's Tule Pea, marsh mudwort, Sanford's arrowhead, marsh scallup, rose-mallow, mad-dog skullcap, Delta coyote-thistle, Point Reyes bird's-beak.

10.1.3.6 Nontidal Freshwater Permanent Emergent

Nontidal freshwater permanent emergent habitat occurs on the landward side of Delta Region levees and in the interiors of Delta Region islands, mostly in constructed waterways and ponds in agricultural areas. Occur throughout the Delta in areas where soils are inundated or saturated for all or most of the growing season, primarily around Delta islands, backwater areas, and in thin bands along Delta rivers and channels where accumulation of sediments has occurred. This habitat also occurs on Delta islands in low-lying areas among crop and pasture land.

10.1.3.6.1 Wildlife

These areas are extremely productive and important habitat for hundreds of different species of birds, mammals, reptiles, and amphibians. Many species entire life cycles rely on this habitat while migratory species, such as ducks and geese, use these wetlands seasonally. Over 50 species of birds, mammals, reptiles, and amphibians use freshwater emergent wetlands in the Delta (CALFED 2000a).

10.1.3.6.2 Special-Status Species

Special-status animal species include: California black rail, giant garter snake, western pond turtle, and greater sandhill crane.

Special-status plant species are similar to those listed above for tidal freshwater permanent emergent habitat.

10.1.3.7 Natural Seasonal Wetland

Seasonal freshwater wetlands include inland freshwater marshes, which maintain surface water during only a portion of the year and vernal pools, which are associated with grasslands.

10.1.3.7.1 Wildlife

The wetlands of the Delta provide habitat for a number of shorebirds and waterfowl species including killdeer, western sandpiper, greater yellow-legs, American coot, American widgeon, gadwall, mallard, canvasback, and common moorhen. Waterfowl and shorebirds prey extensively on invertebrates and forage primarily in permanent saline, brackish, and fresh-water marshes, seasonal wetlands, and agricultural cropland. These areas also support a number of mammals such as coyote, gray fox, muskrat, river otter, and beaver. Several species of reptiles and amphibians also occur in this region.

10.1.3.7.2 Special-Status Species

Special-status species associated with NSW include American peregrine falcon, California gull, greater sandhill crane, long-billed curlew, northern harrier, short-eared owl, Swainson's hawk, tricolored blackbird, white-tailed kite, giant garter snake, California red-legged frog, California tiger salamander, western spadefoot toad, conservancy fairy shrimp, Delta green ground beetle, longhorn fairy shrimp, mid-valley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

Special-status plant species associated with NSW include Alkali milk-vetch, Crampton's tuctoria, Colusa grass, Bogg's lake hedge-hyssop, legenera, Hoover's spurge, Butte County meadowfoam, Greene's tuctoria, slender orcutt grass, hairy orcutt grass.

10.1.3.8 Managed Seasonal Wetland

Large seasonal wetlands managed for waterfowl are in the northwestern part of the Delta Region, west of the Sacramento Deep Water Ship Channel. These managed seasonal wetlands are of great importance to migratory waterfowl and shorebird populations for the forage that these wetlands provide during fall, winter, and spring, when bird populations in the Delta increase dramatically.

A significant managed private wetland in the Central Delta is a 395-acre State easement project on Empire Tract west of Lodi (USFWS 2000). According to the Central Valley Wetlands Supply Investigation (USFWS 2000) the Delta Basin (defined to include all land between the American River and the Stanislaus River, the Sierra Nevada foothills and the Sacramento River/Deepwater ship channel and Coast Range to the west) contains 32,210 acres of privately managed wetlands, 92 percent of which occurs in the Suisun Bay area. The water supply for these privately managed wetlands comes primarily from landowners' riparian or appropriative rights and the distribution by diversion from Delta channels and tributaries directly onto properties.

10.1.3.8.1 Wildlife

MSW habitats are often managed for waterfowl such as mallards, pintails, American widgeon, and Canada and other geese. MSW habitats also support a variety of wading and shorebirds, such as herons, egrets, terns, and gulls.

10.1.3.8.2 Special-Status Species

Special-status animal species associated with MSW include saltmarsh harvest mouse, San Pablo California vole, Suisun ornate shrew, Aleutian Canada goose, American peregrine falcon, bald eagle, black tern, California gull, greater sandhill crane, long-billed curlew, northern harrier, San Pablo song sparrow, short-eared owl, Suisun song sparrow, Swainson's hawk, tricolored blackbird, western snowy plover, white-faced ibis, white-tailed kite, giant garter snake, western pond turtle, California red-legged frog, and vernal pool tadpole shrimp.

Special-status plant species associated with MSW are similar to those listed above for natural seasonal wetlands habitats.

10.1.3.9 Valley/Foothill Riparian

Riparian scrub typically occurs on channel islands or levees and along unmaintained, narrow channel banks of Delta Region creeks, waterways, and major tributaries. The major rivers of the Delta Region include the Sacramento, San Joaquin, Mokelumne, Cosumnes, and Calaveras. About 7,000 acres of riparian vegetation occur primarily on the levees of Delta islands and along the Cosumnes and Mokelumne Rivers. The riparian zone along leveed islands is usually very narrow, but more extensive riparian areas occur along the San Joaquin River just below its confluence with the Stanislaus River and along the Cosumnes River. Scattered throughout the Delta System on islands, along levees, in backwater areas, in sloughs, and in thin bands along river channels.

10.1.3.9.1 Wildlife

VFR habitats provide refuge shelter food water resting and nesting sites for at least 50 amphibian and reptile species, 147 birds, and 55 mammals (Entrix 1996). A number of these species are listed in Section 10.1.2.7.

10.1.3.9.2 Special-Status Species

Special-status animal species associated with VFR habitat include greater western mastiff bat, ringtail, riparian brush rabbit, San Joaquin Valley woodrat, western yellow-billed cuckoo, bank swallow, bald eagle, black-crowned night heron, California yellow warbler, Cooper's hawk, double-crested cormorant, golden eagle, great blue heron, great egret, least bell's vireo, little willow flycatcher, long-eared owl, osprey, snowy egret, Swainson's hawk, white-tailed kite, yellow-breasted chat, giant garter snake, western pond turtle, California red-legged frog, foothill yellow-legged frog, and valley elderberry longhorn beetle.

Special-status plant species associated with VFR include slough thistle, silky cryptantha, Delta coyote-thistle, marsh checkerbloom, fox sedge, rose-mallow, northern California black walnut, and Sanford's arrowhead.

10.1.3.10 Grassland

Grasslands occur in many outlying areas surrounding the Delta and on islands in the Delta.

10.1.3.10.1 Wildlife

Grassland provides foraging and denning habitat for several mammal species such as the California ground squirrel, badger, skunk, and coyote. Other common species found in this habitat include the ring-necked pheasant, western meadowlark, red-tailed hawk, western toad, and gopher snake.

10.1.3.10.2 Special-Status Species

Grassland special-status species includes many of those listed in Sections 10.1.2.9 and 10.1.4.4.

10.1.3.11 Inland Dune Scrub

Inland dune scrub (IDS) habitat comprises vegetated stabilized sand dunes associated with river and estuarine systems. This habitat can be found at the Antioch Dunes National Wildlife Refuge (ADNWR) and Brannan Island State Park. IDS habitat also historically occurred in the Antioch-Oakley areas, Delta marshes, and as small isolated dunes on eastern edge Delta.

10.1.3.11.1 Vegetation

Dominant vegetation is comprised of primarily special-status species, but also includes primrose, wallflower, buckwheat, elegant clarkia, California poppy, California croton, Grindelia, deerweed, telegraph weed, California matchweed, and silver bush lupine.

10.1.3.11.2 Wildlife

Wildlife associated with IDS habitat include mink, desert cottontail rabbit, beaver, muskrat, opossum, weasel, skunk, gopher, gray fox, Beechy ground squirrel, coyote, blacktail jack rabbit, raccoon, Townsend's mole, weasel, red fox, California legless lizard, sideblotched lizard, coast horned lizard, San Joaquin whipsnake, glossy snake, western whiptail lizard and the fence lizard.

10.1.3.11.3 Special-Status Species

IDS special-status species include San Joaquin whipsnake, Lange's metalmark butterfly, Antioch dunes evening primrose, Contra Costa wallflower, and Delta green ground beetle.

10.1.3.12 Upland Cropland

Upland croplands are adjacent to nearly every leveed waterway within the Delta. EWA agencies do not propose to acquire water through crop idling actions in the Delta Region.

10.1.3.13 Seasonally Flooded Agriculture

Approximately 20,000 to 30,000 acres of field crops and grain are post-harvest flooded each winter in the Central Delta (USFWS 2000). EWA agencies do not propose to acquire water through crop idling actions in the Delta Region.

10.1.4 Export Service Area

The Export Service Area includes Anderson Reservoir, San Luis Reservoir, the southern San Joaquin Valley, and portions of southern California focused on the following EWA actions:

- Crop idling within the export service area region would be limited to cotton fields in Fresno, Kings, Tulare, and Kern Counties.
- Groundwater substitution transfers initiated by EWA agencies would occur on farms primarily within the Tulare Basin and the jurisdiction of the Kern County Water Agency.
- Groundwater storage transfers initiated by EWA agencies would occur within the Semitropic Water Storage District and the Arvin-Edison Water Storage District. These water districts use San Luis Reservoir to obtain water for groundwater substitution and groundwater purchase actions.
- San Luis Reservoir can also provide borrowed project water for EWA actions when necessary. (See Section 2.4.2.3.2.)
- Source-shifting agreements to be made with Metropolitan Water District (Metropolitan WD) of Southern California and potentially affecting Metropolitan Water District and SWP facilities. Water supplies sent downstream of the Delta are routed through the San Luis Reservoir to southern California via the California Aqueduct. Within the export service area, the EWA agencies would conduct source-shifting actions using Metropolitan Water District storage facilities (Diamond Valley Lake and Lake Mathews [Metropolitan Water District owned]; Castaic Lake, Silverwood Lake, and Lake Perris [State Water Project owned]); and groundwater storage programs (Semitropic, Arvin-Edison, and Hayfield); and, Santa Clara Valley Water District (Anderson Reservoir).

These areas are predominantly agricultural (cotton, dairy, safflower, wheat, and citrus orchards) and urban environments (such as Fresno, Bakersfield, and Los Angeles). Land left for natural habitats consists mostly of non-native annual grasslands in the San Joaquin Valley and upland scrub or desert habitats in Southern California. Many native habitats of the San Joaquin Valley have declined dramatically in size and quality with the rise of the agricultural industry and urban development.

The sections below describe the NCCP habitats within the Export Service Area. Descriptions for each habitat, including the dominant vegetation, have been given in Section 10.1.2. Where this description differs from that provided in Section 10.1.2, it

will list location of the habitat within the Export Service Area, and the wildlife and special-status species associated with each habitat.

10.1.4.1 Lacustrine

Lacustrine habitats in the Export Service Area include Anderson Reservoir, San Luis Reservoir, Castaic Lake, Lake Perris, Lake Mathews, and Diamond Valley Lake.

10.1.4.1.1 Wildlife

Wildlife found within lacustrine habitat include belted kingfisher, Caspian tern, ring-billed gull, Clark's grebe, western grebe, pied-billed grebe, osprey, common egret, spotted sandpiper, and killdeer. Other birds include white-throated swift, cliff swallow, violet-green swallow, northern rough-winged swallow, and various tern, loon, and waterfowl species such as teal, northern shoveler, pintail, and Canada geese.

10.1.4.1.2 Special-Status Species

Special-status species associated with lacustrine habitats in the Export Service Area includes: Aleutian Canada goose, American peregrine falcon, California gull, great blue heron, osprey, double-crested cormorant, bald eagle, western pond turtle, California red-legged frog, and California tiger salamander.

10.1.4.2 Nontidal Freshwater Permanent Emergent

Elizabeth Canyon at Castaic Lake provides for shallow sandy ledges. A high water associated with the lake table support hydrophilic vegetation (Entrix 1996). Intermittent and perennial tributaries of Castaic Lake support small isolated patches of freshwater emergent wetland habitat.

10.1.4.2.1 Wildlife

Wildlife associated with NFPE habitats can be found in Section 10.1.2.4.

10.1.4.2.2 Special-Status Species

Special-status species associated with NFPE habitats can be found in Section 10.1.2.4.

Special-status plant species associated with NFPE in the Export Service Area includes slough thistle, Hispid's bird's beak, California beaked-rush, and Sanford's arrowhead.

10.1.4.3 Valley/Foothill Riparian

This habitat generally occurs at the shorelines and in association with tributaries that enter the lakes. The eastern shoreline of Lake Perris includes an extensive riparian canopy with a well-developed understory. At San Luis Reservoir riparian habitat was limited to scattered patches of mule fat and occasional willows. Riparian habitat at Anderson Reservoir occurs along tributaries.

10.1.4.3.1 Wildlife

Wildlife associated with VFR habitats in the Export Service Area include black phoebe, red-winged blackbird, brewer's blackbird, ash-throated flycatcher, northern rough-winged swallow, scrub jay, black headed grosbeak, California quail, Nuttall's

woodpecker, plain titmouse, California towhee, Merriam's chipmunk, mule deer, coyote, black bear, mountain lion, and raccoon.

10.1.4.3.2 Special-Status Species

Special-status species associated with VFR habitats can be found in Section 10.1.2.7.

Special-status plant species includes slough thistle and northern California black walnut.

10.1.4.4 Grassland

Non-native annual grasslands surround San Luis Reservoir and portions of Anderson Reservoir. These non-native grasses are mixed with native species such as purple needle grass, creeping wild rye, and onion grass.

10.1.4.4.1 Wildlife

Grassland wildlife includes killdeer, white-throated swift, ring-necked pheasant, American crow, rufous-crown sparrow, rock wren, western meadowlark, red-tailed hawk, American kestrel, common loon, American white pelican, Barrow's goldeneye, savannah sparrow, California vole, black-tailed jackrabbit, California ground squirrel, coyote, foxes, badgers, skunk, western rattlesnake, southern alligator lizard, two-striped garter snake, California mountain kingsnake, and western fence lizard.

10.1.4.4.2 Special-Status Species

Special-status grassland species around San Luis Reservoir include San Joaquin kit fox, American peregrine falcon, Swainson's hawk, California red-legged frogs (tributaries), Aleutian Canada goose, bald eagle, greater sandhill crane, California tiger salamander, foothill yellow-legged frog, western pond turtle, California horned lark, San Joaquin whipsnake, double-crested cormorant, long-billed curlew, California gull, osprey, northern harrier, Cooper's hawk, merlin, prairie falcon, white-tailed kite, ferruginous hawk, western burrowing owl, long-eared owl, loggerhead shrike, and San Joaquin pocket mouse.

Special-status plant species associated with grasslands in the Export Service Area includes: heartscale, brittlescale, San Joaquin spearscale, lesser saltscale, Lost Hills crownscale, Tiburon Indian paintbrush, recurved larkspur, Hoover's eriastrum, spiny-sepaled button-celery, Hall's tarplant, Congdon's tarplant, pale-yellow layia, San Joaquin woollythreads, Panoche peppergrass, red-flowered lotus, showy madia, Merced phacelia, Hartweg's golden sunburst, San Joaquin adobe sunburst, rock sanicle, most beautiful jewel-flower, and showy Indian clover.

10.1.4.5 Upland Scrub

Upland scrub habitat occurs on the slopes and shorelines surrounding Lakes Perris and Mathews, Castaic and Diamond Valley Lakes, and Anderson Reservoir. This habitat consists of mixed chaparral and coastal scrub vegetation including chamise, scrub oak, big berry manzanita, mountain mahogany, yucca, and big pod ceanothus. Blue elderberry is infrequent. Upland scrub also includes purple sage, white sage, rabbit brush, California sage, and California buckwheat.

10.1.4.5.1 Wildlife

Wildlife associated with upland scrub habitats in the Export Service Area includes scrub jay, common raven, greater roadrunner, Anna's hummingbird, mourning dove, song sparrow, western fence lizard, granite spiny lizard, black bear, bobcat, mountain lion, Merriam's chipmunk, California ground squirrel, western rattlesnake, coast horned lizard, and alligator lizard.

10.1.4.5.2 Special-Status Species

Special-status upland scrub species around Castaic Lake include arroyo toad and California red-legged frog (tributaries), California newt, foothill yellow-legged frog, San Diego horned lizard, western pond turtle, Cooper's hawk, northern harrier, sharp-shinned hawk, golden eagle, osprey, prairie falcon, and loggerhead shrike.

Special-status upland scrub species around Lake Perris, Lake Mathews, and Diamond Valley Lake include Stephen's kangaroo rat, western spadefoot toad, San Diego horned lizard, double-crested cormorant, Cooper's hawk, osprey, golden eagle, northern harrier, sharp-shinned hawk, loggerhead shrike, short-eared owl, burrowing owl, yellow warbler, and yellow-breasted chat.

Special-status plant species associated with upland scrub habitats in the Export Service Area includes: San Benito evening-primrose, Shrasmith's harebell, tree anemone, Mt. Hamilton coreopsis, Brandegee's eriastrum, Ben Lomond buckwheat, Hall's bush mallow, San Antonio Hills monardella, Mt. Diablo phacelia, rock sanicle, most beautiful jewel-flower, Mt. Hamilton jewelflower, Coyote ceanothus, and Arburua Ranch jewelflower.

10.1.4.6 Valley/Foothill Woodland and Forest

Scattered blue oak woodlands occur on the western shore of the San Luis Reservoir. Isolated patches of coast live oak woodland occur at scattered locations in association with upland scrub habitats at Castaic Lake. The hillsides adjacent to Anderson Reservoir display a combination of blue oak/foothill pine and coast live oak woodlands.

10.1.4.6.1 Wildlife

Wildlife associated with VFW habitats includes acorn woodpecker, northern flicker, wild turkey, plain titmouse, black-tailed jackrabbit, American crow, California quail, western fence lizard, coyote, mule deer, western bluebird, white-breasted nuthatch, and American kestrel.

10.1.4.6.2 Special-Status Species

Special-status species associated with VWF are listed in Section 10.1.2.11.

Special-status plant species includes, Sharsmith's onion, Big Bear Valley woolypod, San Benito evening-primrose, tree anemone, Mt. Hamilton coreopsis, recurved larkspur, Brandegee's eriastrum, Ben Lomond buckwheat, Hall's tarplant, pale-yellow layia, Madera linanthus, red-flowered lotus, showy madia, San Antonio Hills monardella, Mt. Diablo phacelia, rock sanicle, and Mt. Hamilton jewelflower.

10.1.4.7 Upland Cropland

Upland cropland areas are found throughout the San Joaquin Valley. However, EWA water acquisition actions will only involve cotton fields in the San Joaquin Valley.

“Cotton is of limited value to wildlife because of the intensive management of this crop and the use of chemicals to control pests and disease. Mourning doves and house mice are found in this crop type. During irrigation when vegetation is short and sparse additional wildlife including killdeer, American pipet, and horned lark may be attracted (CALFED 1998).”

Associated agricultural ditches are also treated with chemicals to control vegetation, making these ditches also less suitable for wildlife. Figure 10-6 is a picture of cotton farmland habitat.



Figure 10-6
Upland Cropland – Cotton Habitat

10.2 Environmental Consequences/Environmental Impacts

The following section evaluates the effects of the EWA alternatives on vegetation and wildlife. This section includes discussions on the following topics:

- Special-status species and NCCP communities included in the effects analysis;
- Methods used to assess effects of EWA program actions;
- Conservation measures posed to avoid or minimize effects of EWA actions on vegetation and wildlife;
- Effects of each alternative on NCCP habitats and associated wildlife in the area of analysis;
- Comparison of each alternatives' effects on the NCCP habitats and associated wildlife; and
- Analysis of the cumulative effects on the NCCP habitats and associated wildlife.

10.2.1 NCCP Communities and Special-Status Species Addressed in the EIS/EIR and ASIP

To comply with NEPA, CEQA, ESA, CESA, and NCCPA requirements, the EWA agencies must identify a list of NCCP communities and special-status species for evaluation in the EWA EIS/EIR and ASIP. The following section describes the processes for selecting NCCP habitats and special-status species for analysis.

10.2.1.1 Identification of NCCP Communities Analyzed

A total of twenty natural communities were analyzed on a broad, programmatic basis in the MSCS – 18 habitats and two ecologically based fish groups. The term “NCCP communities” refers to both NCCP habitats and fish groups. Chapter 9 of this EIS/EIR analyzes the fish groups. This EIS/EIR includes addresses 15 of the 18 NCCP habitats analyzed in the MSCS.

10.2.1.1.1 *Determining the Likelihood that EWA Actions would Affect NCCP Habitats*

EWA actions were considered likely to affect evaluated habitats adversely or beneficially:

- If the quality of the habitat to support populations of species is changed;
- If habitat of a species, critical to the viability of the population, is present in the area where actions could be implemented;
- Implementing one or more actions may affect or could result in take of the species; or
- Implementing the actions would increase or decrease the extent or quality of habitat potentially occupied by the species.

Out of the 20 community types, this EIS/EIR does not evaluate five community types for the reasons given below. Detailed descriptions of the 20 habitats, including their assigned conservation goal from the MSCS, can be found in the EWA ASIP Chapter 5 and Appendix A of the EWA ASIP, which are included as Appendix H of this EIS/EIR.

10.2.1.1.2 *Grassland*

EWA actions would not affect this habitat because the root zone of the plant species is elevated above any EWA water acquisition/management-induced groundwater and reservoir level change. EWA actions would not lead to restoration of the function of this habitat.

10.2.1.1.3 *Upland Scrub*

EWA actions will not affect this habitat because the root zone of the plant species is elevated above any EWA water acquisition/management -induced groundwater and reservoir level change. EWA actions will not lead to restoration of the function of this habitat.

10.2.1.1.4 Valley/Foothill Woodland and Forest

EWA actions will not affect this habitat because the root zone of the plant species is elevated above any EWA water acquisition/management -induced groundwater and reservoir level change. EWA actions will not lead to the restoration of this habitat.

10.2.1.1.5 Montane Woodland and Forest

EWA actions will not affect this habitat because the root zone of the plant species is elevated above any EWA water acquisition/management -induced groundwater and reservoir level change. EWA actions will not lead to the restoration of this habitat.

10.2.1.1.6 Inland Dune Scrub

EWA actions will not affect this habitat because the root zone of the plant species is elevated above any EWA water acquisition/management -induced groundwater and reservoir level change. EWA actions will not lead to the restoration of this habitat.

10.2.1.2 Identification of Species to be Analyzed

The analysis includes the special-status species that fit into at least one of the following categories and potentially occur in the EWA Asset Acquisition and Management Areas (Figure 2-3):

- Listed as threatened or endangered under FESA;
- Proposed for listing under FESA;
- Candidates for listing under FESA;
- Listed as threatened or endangered under CESA;
- Candidates for listing under CESA;
- Plants listed as rare under the California Native Plant Protection Act;
- Fully protected species or specified birds under various sections of the California Fish and Game Code;
- California species of special concern (CSC);
- Plants included on California Native Plant Society (CNPS) List 1 A, IB, 2, or 3;
- Other native species of concern to CALFED; or
- Aquatic species with designated Essential Fish Habitat within the area of analysis.

Pursuant to Section 7(c) of ESA, the EWA agencies requested species lists from USFWS, NOAA Fisheries, and CDFG regarding any species listed or proposed for listing as threatened or endangered, including designated or proposed critical habitats under ESA and CESA that may be present in the EWA area of analysis. Additionally, the EWA agencies developed a list of special-status species known to occur or with

the potential to occur within the area of analysis compiled from the California Natural Diversity Database (CNDDDB) and California Native Plant Society's Inventory of Rare and Endangered Plants. More than 400 special-status fish, wildlife, and plant species considered⁴ in the MSCS were combined with the results from the species request lists and the database search to generate a preliminary species list. (See EWA ASIP, Table A-1.)

Species included in this preliminary species list were then screened to identify all species that occur outside of the area of analysis. Additional species were screened out because they occur in habitats that the EWA actions would not affect (as described in Section 1.4.2 of the ASIP).

The final selection process determined which special-status species should be included based on several considerations that helped determine if EWA asset acquisition and management actions could affect the species or the habitat of listed species⁵. After all of the screening steps, this EIS/EIR and EWA ASIP includes the following species:

- MSCS covered terrestrial species whose life cycles are dependent on seasonally flooded agricultural land;
- MSCS covered species that extensively use agriculture water supply/return ditches as habitat; and
- MSCS covered species that use seasonally flooded agriculture land for a portion of their life cycle (e.g., nesting/forage during the summer, over-winter forage for winter migrants).

Species that are analyzed in detail in the EWA ASIP are described in relation to their association with seasonally flooded agricultural land below. These species include the Aleutian Canada goose, black tern, black-crowned night heron, great blue heron, great egret, greater sandhill crane, long-billed curlew, snowy egret, tricolored blackbird, white-faced ibis, giant garter snake, and western pond turtle.

Aleutian Canada Goose: During the winter, the Aleutian Canada Goose forages on post-harvest wastegrain, among other items, in the Sacramento Valley.

Black Tern: The black tern uses rice fields, primarily in Glenn and Colusa Counties for both nesting and foraging.

⁴ Actions considered by CALFED when analyzing effects in the PEIS/EIR and MSCS did not include crop idling; therefore, this ASIP used the list of MSCS considered species as a basis for its preliminary species list rather than the list of MSCS evaluated species.

⁵ Based on the description of the Flexible Purchase Alternative provided in Chapter 2 the following EWA actions are most likely to affect MSCS covered species: 1) the pumping of EWA assets to the Export Service Area, 2) reduction in Delta outflows, 3) changes in timing of releases of water from reservoirs, and 4) crop idling involving seasonally flooded agriculture (rice).

Black-crowned Night Heron: The black-crowned night heron forages along irrigation canals and other waterways associated with rice crops throughout the Sacramento Valley.

Great Blue Heron: The great blue heron forages along irrigation canals and other waterways associated with rice crops throughout the Sacramento Valley.

Great Egret: The great egret has similar life history requirements as the great blue heron.

Greater Sandhill Crane: During the winter, the greater sandhill crane forages on waste grain remaining in fields following the harvesting of the rice crop, particularly in the Butte Basin.

Long-billed Curlew: The Long-billed Curlew uses rice fields to forage for invertebrates during the winter.

Snowy Egret: The snowy egret has similar life history requirements as the great blue heron and great egret.

Tricolored Blackbird: The tricolored blackbird forages on grain provided by rice along with insects.

White-faced Ibis: The white-faced ibis uses rice fields to forage for invertebrates during the winter.

Giant Garter Snake: In some portions of the Sacramento Valley, the giant garter snake is highly dependent upon rice fields for the majority of its habitat requirements.

Western Pond Turtle: The western pond turtle uses irrigation and drainage ditches adjacent to rice fields for resting and foraging habitat.

10.2.1.3 Description of Species Not Analyzed In Detail

Species are not included in this EIS/EIR if they may occasionally visit, but are not dependent on, seasonally flooded agriculture land (e.g., migrants or species with broad home ranges) and would not be affected by EWA crop idling actions. The following text lists those species and explains the rationale for the no effects determination. The EWA ASIP Appendix A (Appendix J to this EIS/EIR) presents additional details regarding the life histories and status of these species.

10.2.1.3.1 Western Spadefoot Toad

Levees and drainage ditches are potential habitat for the western spadefoot toad. They use ditch bottoms in the spring for breeding (at times when EWA idling actions would not be occurring) and the levee sides as habitat the remainder of the year. The EWA asset acquisition and management actions would not physically affect levees or the quantity of rainwater in ditches adjacent to rice fields.

10.2.1.3.2 Double-Crested Cormorant

Double-crested cormorant use levees adjacent to rice fields to dry their wings. EWA asset acquisition and management actions would not affect levees adjacent to rice fields.

10.2.1.3.3 American Bittern

American bitterns forage in flooded rice fields and adjacent irrigation ditches during the winter primarily for invertebrates. EWA asset acquisition and management actions would not prevent flooding of fields in the winter.

10.2.1.3.4 White-tailed Kite

During the winter, white-tailed kites forage for small rodents, insects, frogs, and snakes over flooded and idled rice fields. EWA asset acquisition and management actions would not prevent the winter flooding of fields. EWA actions have the potential to increase the overall acreage of idled rice fields increasing the forage base for this species. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.5 Bald Eagle

Bald eagles forage for ducks, geese, and sometimes fish over large areas, including rice fields. This species, however, is highly mobile with a home range radius of approximately 1 mile, whereas the largest possible block of idled land will be 160 acres (½ mile X ½ mile). EWA asset acquisition and management actions would not reduce the forage supply of waterfowl and fish within the Sacramento Valley.

10.2.1.3.6 Swainson's Hawk

Swainson's hawks forage in idled rice fields. EWA asset acquisition and management actions have the potential to increase the overall acreage of idled rice fields, increasing the forage base for this species. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.7 Ferruginous Hawk

Ferruginous hawks forage for small mammals in idled rice fields. EWA asset acquisition and management actions have the potential to increase the overall acreage of idled rice fields. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.8 Golden Eagle

Golden eagles forage over large areas that include rice fields near their nests in the foothills surrounding the Central Valley. This species, however, is highly mobile with an extensive home range, whereas the largest possible block of idled land will be 160 acres (½ mile X ½ mile).

10.2.1.3.9 Merlin

During the winter, merlins forage for songbirds and shorebirds over flooded and idled rice fields. EWA asset acquisition and management actions would not prevent the winter flooding of fields. EWA actions have the potential to increase the overall

acreage of idled rice fields. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.10 *Peregrine Falcon*

During the winter, peregrine falcons forage for ducks and shorebirds over flooded and idled rice fields. EWA asset acquisition and management actions would not prevent flooding of fields. EWA actions have the potential to increase the overall acreage of idled rice fields. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.11 *Prairie Falcon*

During the winter, the prairie falcon forages over flooded and idled rice fields. EWA asset acquisition and management actions would not prevent flooding of fields. EWA actions have the potential to increase the overall acreage of idled rice fields.

10.2.1.3.12 *Mountain Plover*

The mountain plover uses disced rice fields in late winter to find insects. EWA asset acquisition and management actions would not prevent disking of these fields, which would ensure forage habitat is maintained for the mountain plover.

10.2.1.3.13 *Short-eared Owl*

The short-eared owl could find a suitable prey base in idled rice fields. EWA asset acquisition and management actions have the potential to increase the overall acreage of idled rice fields. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.14 *Northern Harrier*

The northern harrier could find a suitable prey base in idled rice fields. EWA asset acquisition and management actions have the potential to increase the overall acreage of idled rice fields. This potential benefit cannot be quantified and is not addressed further in this EIS/EIR.

10.2.1.3.15 *Long-eared Owl*

Long-eared owls can be found in trees along rice fields and forage over idled fields at night. EWA asset acquisition and management actions have the potential to increase the overall acreage of idled rice fields and would not affect woodlands.

10.2.1.3.16 *Burrowing Owl*

Burrowing owls can be found on the levees bordering rice fields. EWA asset acquisition and management actions would not affect these levees.

10.2.1.3.17 *Bank Swallow*

During the spring and summer, bank swallows can be found foraging for insects over rice fields. This species, however, is highly mobile with a foraging range of 8-10 km, whereas the largest possible block of idled land will be 160 acres (½ mile X ½ mile).

10.2.1.3.18 Bewick's Wren

Bewick's wrens are casual visitors to rice fields in the fall and winter. They are sometimes found feeding along weedy irrigation ditches or in idled rice fields. EWA asset acquisition and management actions would not affect irrigation ditches and would increase the acreage of idled rice fields.

10.2.1.3.19 Loggerhead Shrike

Loggerhead shrikes can be found hunting along the borders of rice fields and in idled rice fields. EWA asset acquisition and management actions would increase the acreage of idled rice fields and would not affect adjacent ditches.

10.2.1.3.20 Lark Sparrow

Lark Sparrows are casual visitors to rice fields in the fall and winter. They are sometimes found feeding along weedy irrigation ditches or in idled rice fields. EWA asset acquisition and management actions would increase the acreage of idled rice fields and would not affect adjacent ditches.

Terrestrial species that may be associated with lacustrine habitats (lakes, ponds, oxbows, gravel pits), such as bald eagles and osprey, are also not included because the analysis of EWA actions produced no adverse affect to fish populations (see Chapter 9), which can be a primary food source.

10.2.2 Assessment Methods

The assessment methods used for this analysis address effects on vegetation and wildlife, special-status species, and NCCP communities caused by implementation of EWA actions. The EWA ASIP (Appendix J) presents additional information on special-status species and associated habitats. ASIP preparation satisfies compliance with the state and federal endangered species laws.

EWA actions to benefit fish include pump reductions, Delta cross channel closure, instream flow increases, and Delta outflow augmentation. EWA asset acquisition and management actions include pre-delivery, source shifting, purchasing stored reservoir water, using groundwater substitution and/or storage, purchasing stored groundwater, and crop idling. These actions may affect the following variables: 1) the timing of water releases, 2) river flows, 3) reservoir levels, 4) water table levels, or 5) the number of acres of seasonally flooded land. Effects to plant communities may include changes in water availability, alteration of species composition, and removal, conversion, or fragmentation of communities. Changes in the quantity or quality of habitat, loss of forage and cover, and fragmentation of habitat could affect wildlife species.

This section analyzes effects to vegetation, wildlife, and NCCP communities at a community level; that is, this analysis assumes that if the EWA asset acquisition and management actions adversely affect an NCCP community, then the EWA asset acquisition and management actions would also adversely affect any species associated with that community. Where necessary, this analysis evaluates effects to

special-status species both on a community and species level. Additional details regarding the NCCP communities and special status species are presented in the ASIP.

10.2.2.1 Tidal Perennial Aquatic, Saline Emergent, and Tidal Freshwater Emergent Habitats

These three habitat types are found in portions of the Delta, and could potentially be affected by changes in magnitude and timing of Delta flows, which could also affect Delta water quality. The CALSIM II model simulates Delta inflows, Delta outflows, and Delta exports with and without the EWA program. CALSIM provides monthly flow data, which does not reflect the daily tidal variations that occur within the Delta. To determine more Delta-specific effects, DWR's Delta Simulation Model (DSM) 2 calculated Delta water quality and flow data at a more detailed level. Attachment 1 to this EIS/EIR describes these modeling efforts in greater detail. Model results were used to compare the frequency and magnitude of changes within the Delta to determine if these changes could affect Tidal Perennial Aquatic, Saline Emergent, or Tidal Freshwater Emergent Habitats or the species that depend on them.

10.2.2.2 Nontidal Freshwater Permanent Emergent

Within the Delta, the methods of assessing impacts to the Nontidal Freshwater Permanent Emergent habitat are the same as for the Tidal Freshwater Emergent, Upstream from the Delta, where this community may be supported by an elevated groundwater table, the lowering of the water table as part of groundwater substitution could affect this habitat. The effects analysis considers groundwater level changes from groundwater substitution, and a geographic comparison of the potential groundwater changes to areas with Nontidal Freshwater Permanent Emergent habitat.

10.2.2.3 Valley Riverine Aquatic, Montane Riverine Aquatic, Valley/Foothill Riparian, and Montane Riparian Habitats

EWA actions could affect these habitat types by changing the timing and volume of flows within rivers. The sections below describe how the flows were determined for each river.

10.2.2.3.1 Sacramento, Lower Feather, and Lower American Rivers

The analysis of potential effects on these habitats associated with rivers that are part of the CVP and SWP systems utilized the hydrologic modeling results. Attachment 1, the Modeling Description, provides a discussion of the hydrologic modeling process and its application to the EWA program analysis, including 1) the primary assumptions and model inputs that represent hydrologic, regulatory, structural and operational conditions; and 2) the model simulations that helped derive effects. For these rivers, modeling results were based on the maximum assets contained in Table 2-5, rather than available pump capacity as was used in Chapter 9.

10.2.2.3.2 *Yuba, Upper Feather, Upper American, and Merced Rivers*

These rivers are not a part of the CVP or SWP systems, and are therefore not included in the CALSIM II model. Attachment 1, the Modeling Description, describes the alternative methodology used to calculate changes in monthly operations based on historic water river flow data gathered from USGS. The effects analysis compares the changes in river flows to the surrounding vegetation to determine if the changes would affect these habitat types.

10.2.2.4 **Lacustrine**

EWA water storage and management actions involving reservoirs would alter reservoir levels compared with the Baseline, potentially causing effects to the lacustrine community. Fluctuations in reservoir levels as a result of EWA asset storage and releases, if significantly different from the Baseline Conditions of the reservoirs could affect vegetation and associated wildlife species that are established at or near the water surface and within the drawdown zone and are not accustomed to the changes in reservoir levels. The sections below discuss the analysis methodologies for the rivers within the area of analysis.

10.2.2.4.1 *CVP and SWP Reservoirs (Shasta, Oroville, and Folsom Reservoirs)*

The analysis of potential effects on lacustrine habitat associated with CVP and SWP reservoirs utilized the hydrologic modeling results. Attachment 1, the Modeling Description, provides a discussion of the hydrologic modeling process and its application to the EWA program analysis, including 1) the primary assumptions and model inputs that represent hydrologic, regulatory, structural and operational conditions; and 2) the model simulations that helped derive effects.

10.2.2.4.2 *Upstream from the Delta Non-Project Reservoirs*

Several non-Project reservoirs upstream of the Delta (Little Grass Valley, Sly Creek, New Bullards Bar, French Meadows, Hell Hole, Lake McClure) could sell water to the EWA agencies. Because the CVP and SWP do not manage these non-Project reservoirs, the CALSIM II hydrologic modeling simulations do not reflect these reservoir operations. Attachment 1, the Modeling Description, describes the alternative methodology used to calculate changes in monthly operations based on historic water storage data. The effects analysis compares the rate of changes in storage and elevation to the surrounding vegetation to determine if the reservoir changes would affect the lacustrine community.

10.2.2.5 **Natural Seasonal Wetland**

High groundwater levels can create Natural Seasonal Wetlands; therefore, if the EWA asset acquisition and management actions decrease groundwater levels, this change could affect this habitat type. The specific locations in the Sacramento and San Joaquin valleys where groundwater substitution and groundwater purchase could occur are not currently identified and can vary year to year based on EWA water acquisition strategies and willing sellers. Mitigation measures proposed for groundwater actions (Chapter 6) may preclude this effect, but the groundwater measures have not been tested and there is no current mechanism for assessment of

the effect because specific locations for groundwater actions are not known. Therefore, the effect of the EWA water acquisitions can only be assessed in a qualitative sense.

10.2.2.6 Managed Seasonal Wetland

The EWA agencies have not identified the specific locations in the Sacramento and San Joaquin valleys where crop idling and groundwater substitution transfers could occur because they can vary year to year based on the location of willing sellers and EWA water acquisition strategies. Therefore, the following section assesses the effect of the EWA water acquisitions in a qualitative sense.

To determine if groundwater substitution transfers affect water in ditches, the analysis qualitatively examines the process that water agencies would use to sell water to the EWA agencies to determine if this process could decrease the water available to managed seasonal wetlands. Return flows may decrease if farmers idle lands that are upstream of managed seasonal wetlands. The analysis qualitatively examines the likelihood that crop idling would reduce flows within agricultural ditches, and compares the locations of ditches with decreased flows to wetlands that receive water from the same sources.

10.2.2.7 Upland Cropland

The impact assessment methods for this community were based on the relative value of a particular crop as wildlife habitat and forage. The EWA agencies propose to purchase water that would have been used to irrigate cotton farmland. This would idle the land, resulting in bare fields. Neither the cotton land nor bare field would provide for significant wildlife habitat. Dust suppression plans may involve the use of a substitute crop, providing some wildlife value. The EWA agencies are not specifically requiring farmers to substitute other crops; therefore, crop substitution is not factored into the effects analysis. However, because cotton land provides extremely marginal habitat and forage, the effects analysis does not assess the EWA's asset acquisition and management action effects on this habitat.

10.2.2.8 Seasonally Flooded Agriculture

Potential effects on special-status species associated with SFA were determined based on an analysis of changes in the amount of habitat and forage provided by rice fields within each county having water agencies that potentially would sell water to EWA agencies.

10.2.2.8.1 *Changes in Habitat Availability*

This SFA effects analysis addresses water acquisitions that would result in the maximum potential quantities available from crop idling. The SFA impact analysis includes the following steps:

- Derivation of the acquisition quantity for each county by the evapotranspiration of applied water⁶ to determine the amount of idled acreage required to obtain the acquisition amount;
- Comparing the total acreage required for EWA crop idling to the amount in the rice land in the 1997 Agricultural Census data to obtain the change in rice acreage per county; and
- Calculating the absolute and relative change in rice habitat availability using the changes in rice acreage numbers.

The analysis presents change in rice habitat availability both as an absolute quantity (number of acres) and relative value (percent of rice acreage).

10.2.2.8.2 *Changes in Forage Availability*

Waste grain remaining after rice harvest serves as a food resource for wildlife species, including the special-status species associated with rice fields identified in Table 10-3. Consequently, changes in the amount of rice acreage would change the availability of forage for special-status species associated with rice fields. Each acre of rice provides approximately 300 to 350 pounds per acre (lbs/ac) of waste grain (Brouder and Hill 1995). Although newer technologies used for harvesting generate less waste grain per acre, this analysis uses 350 lbs/acre to provide a conservative estimate for the amount of waste grain lost due to rice idling (Brouder and Hill 1995). This analysis presents the total amount of waste grain lost due to rice idling for each county, and expressed as an absolute quantity (lbs) and relative value (percent of forage provided by rice in the county).

Rice fields also provide approximately 250 lbs/ac of other food (not waste rice grain), which is comprised primarily of invertebrates (Brouder and Hill 1995). This analysis assumed that some plant species (weeds and other plant species that could colonize idled fields) and invertebrates would still be available in idled fields, and that crop idling would not substantially reduce this food source. Accordingly, potential effects on other food available to wildlife species were considered to be insignificant and are not further analyzed in this section.

10.2.2.8.3 *Habitat Fragmentation*

A decrease in the availability of SFA under the EWA program has the potential to contribute to fragmentation and isolation of wetland habitats within an individual county on a temporary basis. Because the EWA is a program, and the specific fields where idling will occur cannot be predicted and will change from year to year, the degree of fragmentation within a county cannot be quantified. In addition, EWA program crop idling actions are dependent upon hydrologic year type and more than likely will not occur every year. Consequently, this section does not include an analysis of habitat fragmentation and isolation. Potential temporary fragmentation

⁶ The Evapotranspiration of Applied Water (ETAW) represents the amount of applied water that is used by the crop for evapotranspiration. This number is defined in Section 2, Program Description, and is approximately 3.3 acre-feet per acre for rice.

and isolation effects, however, will be avoided through crop idling conservation measures. Specifically, the EWA agencies will minimize crop idling in adjacent fields within each county.

10.2.3 Significance Criteria

Under criteria based on State CEQA Guidelines and the CALFED Programmatic EIS/EIR, the proposed project would be considered to have a significant effect on vegetation and wildlife if it would result in any of the following:

- Adversely affect, either directly or through habitat modifications, any endangered, rare, or threatened species, as listed in Title 14 of the California Code of Regulations (sections 670.2 or 670.5) or in Title 50, Code of Federal Regulations. (See sections 17.11 or 17.12;)
- Have a substantial adverse impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Cause a reduction in the area or habitat value of critical habitat areas designated under the federal ESA;
- Substantially fragment or isolate wildlife habitats or movement corridors, especially riparian and wetland habitats, or impede the use of wildlife nurseries;
- Have a substantial adverse impact, such as a reduction in area or geographic range, on any riparian habitat, other sensitive natural community, or significant natural areas identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;
- Adversely affect federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) either individually or in combination with the known or probable impacts of other activities through direct removal, filling, hydrological interruption, or other means;
- Substantially decrease the size of important native upland wildlife habitats or wildlife use areas; and
- Substantially decrease the amount of available forage, including forage from agricultural lands for wintering waterfowl.

10.2.4 Environmental Measures Incorporated into the Program

Environmental measures applicable to the EWA actions for each species and NCCP habitat that have been incorporated into the program description are described in this section. The MSCS also includes programmatic conservation measures for each species and NCCP community.

10.2.4.1 Environmental Measure Applicable to all Species

The EWA Project agencies will coordinate EWA water acquisition and transfer actions with Federal (Reclamation, USFWS and NOAA Fisheries), State (DWR and CDFG), other CALFED agencies, and regional programs (e.g., the San Francisco Bay Ecosystem Goals Project, the Anadromous Fish Restoration Program, the Senate Bill [SB] 1086 program, the U.S. Army Corps of Engineers' (USACE's) Sacramento and San Joaquin Basin Comprehensive Study, the Riparian Habitat Joint Venture, the CVPIA, the Central Valley Habitat Joint Venture, and the Grassland Bird Conservation Plan) that could affect management of evaluated species. Coordination would avoid conflicts among management objectives and would be facilitated through CALFED's water transfer program.

10.2.4.1.1 Giant Garter Snake (T-FESA; T-CESA)

Within the Sacramento River valley, the giant garter snake (GGS) is highly dependent on rice fields and associated irrigation ditches. EWA actions, or cumulatively, water acquisitions, could idle up to 20 percent of flooded rice fields in each county. The following text provides the proposed approach and conservation measures to protect the GGS.

As part of the EWA consultation, the USFWS will give programmatic approval to crop idling, followed by a site-specific consultation process to ensure consistency with the programmatic approval. The programmatic consultation will include three main elements: 1) the process by which site-specific agreements will be attained; 2) the list of conservation measures (avoidance, minimization, and conservation measures) which would be used wholly or in part to minimize effects of water transfers involving fallowing or crop-shifting; and 3) a description of GGS conservation strategy in Chapter 4 of this ASIP.

USFWS EWA consultation with the Project Agencies will outline a year-by-year "site specific" process to address crop idling impacts to GGS and will put boundaries on upper limit on the amount of crop idling that may occur in any given year, considering the existing 20 percent limit. Additional measures to those presented in this EIS/EIR may be incorporated as a part of consultation based on site-specific conditions.

Each year, once it has been determined that crop idling will occur, the EWA Project Agencies will contact USFWS staff to begin informal consultation and will put together a package describing where the idling activities will take place and what proposed minimization measures will be followed. This package will include maps of the proposed idled fields. USFWS will work with the EWA Project Agencies to determine if minimization measures proposed are sufficient and if additional compensatory habitat is required.

The EWA agencies will ensure through contract terms or other requirements that the following conservation measures will be implemented:

- The EWA agencies will ensure parcels from which water is to be acquired are outside of mapped proscribed areas (see ASIP Figure 3-11), which include:
 - *Refuges* – Land adjacent and within 1 mile of Sacramento, Delevan, Colusa, Sutter, and Butte Sink National Wildlife Refuge (NWR), and the Llano Seco Unit of the Sacramento River NWR, Gray Lodge Wildlife Area (WA), Upper Butte Basin WA, Yolo Bypass WA, and Gilsizer Slough CE;
 - *Corridors Between Refuges* – Lands adjacent to Hunters and Logan Creeks between Sacramento River NWR and Delevan NWR; Colusa Basin Drainage Canal between Delevan NWR and Colusa NWR; Little Butte Creek between Llano Seco units of Sacramento River NWR and Upper Butte Basin WA, and Howards Slough Unit of the Upper Butte Basin WA, Butte Creek Upper Butte Basin WA, and Gray Lodge WA;
 - *Waterways Serving as Corridors* – Land adjacent to Butte Creek, Colusa Basin Drainage Canal, Gilsizer Slough, land side toe drain along east side of the Sutter Bypass, Willow Slough and Willow Slough Bypass in Yolo County, North Drainage Canal and East Drainage Canal in Natomas Basin
 - *Other Core Areas* – East of SR99 and between Sutter-Sacramento County line and Elverta Road in Natomas Basin, Yolo County east of Highway 113;
- The water seller will ensure that water is maintained in irrigation and drainage canals to provide movement corridors;
- The water agency will ensure that the block size of idled rice parcels will be limited to 160 acres (includes rice fields shifting to another crop);
- The water agency will ensure that mowing along irrigation and drainage canals will be minimized and mowers will be elevated to at least 6 inches above the ground level;
- The water agency will ensure that, if canal maintenance such as dredging is required, vegetation will be maintained on at least one side; and
- The EWA agencies will maximize geographic dispersal of idled lands.

GGS conservation measures may include the following, as appropriate:

- The EWA agencies will avoid purchasing water from the same field for more than two consecutive years;

- The EWA agencies will recommend that sellers replace culverts already planned for repair or replacement with oversized culverts to facilitate better wildlife dispersal;
- The EWA agencies will recommend that sellers replace water control structures with those requiring less maintenance and less frequent replacement in order to minimize maintenance impacts (steel or wooden control boxes with pre-poured concrete boxes); and
- The water agencies may fund research or surveys.

10.2.4.1.2 Greater Sandhill Crane (T/FP-CESA)

Crop idling of seasonally flooded agricultural land could reduce the amount of over winter forage for migratory birds.

- Avoid or minimize actions near known wintering areas in the Butte Sink (from Chico in the north to the Sutter Buttes, and from Sacramento River in the west to Highway 99) that could adversely affect foraging and roosting habitat.

10.2.4.1.3 Black Tern (SSC-CDFG)

Crop idling of seasonally flooded agricultural land could reduce the amount of nesting and forage habitat during the summer rearing season.

- As part of the review process for the identification of areas acceptable for crop idling, the Management Agencies will review current species distribution/occurrence information from the Natural Diversity Database and other sources (including rookeries, breeding colonies, and concentration areas). The Management Agencies will then use the information to make decisions that will avoid EWA crop idling actions that could result in the substantial loss or degradation of suitable habitat in areas that support core populations of evaluated species that are essential to maintaining the viability and distribution of evaluated species.
- As part of contractual agreements, the willing seller will be required to maintain quantities of water in agriculture return flow ditches that maintains existing wetland habitat providing habitat to the covered species.

10.2.4.1.4 Western Pond Turtle (SSC-CDFG)

Ditches and drains associated with rice fields provide suitable habitat for the western pond turtle. The following environmental measures would ensure effects of crop idling actions on western pond turtle habitat are avoided or minimized.

- The willing seller will be required to maintain water levels in irrigation and drainage canals to within 6 inches of non-program conditions and do not completely dry out canals.

10.2.4.1.5 *Non-tidal Freshwater Permanent Emergent, Natural Seasonal Wetland, and Valley/Foothill Riparian Communities*

Natural and Managed Seasonal Wetlands and Riparian Communities often depend on surface water-groundwater interactions for part or all of their water supply. The following environmental measures would ensure effects on these communities from groundwater substitution actions are avoided or minimized.

- **A Well Adequacy Review.** Before groundwater substitution actions the hydrogeologic conditions of wells used to transfer EWA water will be examined to minimize the potential risk of depleting surface water sources and adversely affecting associated vegetation; and
- **A Monitoring Program.** The Project Agencies will implement a monitoring program that will provide data to determine if direct or indirect effects exist.

10.2.4.1.6 *Valley/Foothill Riparian and Montane Riparian Communities*

Riparian plant germination, establishment, growth, and distribution are driven by water availability and floodplain and channel geomorphology that conform to historical patterns. The following environmental measure would ensure effects on these communities would be avoided or minimized.

- The EWA agencies will implement a monitoring program, in cooperation with other programs, that will provide flow data and observations of habitat changes to determine if changes in flows are having a direct or indirect effect on riparian communities, particularly establishment of seedlings and survival of middle age classes.

10.2.4.1.7 *Managed Seasonal Wetlands*

Landowners with managed seasonal wetland communities often depend upon agricultural return flows for part or all of their water supply. The following environmental measure would ensure effects on this wetland community would be avoided or minimized.

- As a part of the contractual agreements, the EWA agencies will require the willing seller of water for crop idling to maintain their drainage systems at a water level that would maintain existing wetlands providing habitat to covered species. As part of monitoring program to ensure compliance with the contractual requirements, EWA agencies will periodically verify that the seller is adhering to the agreement and that no effects are occurring.

10.2.4.1.8 *Seasonally Flooded Agricultural Lands*

Environmental measures for seasonally flooded agricultural lands are provided for the giant garter snake.

10.2.5 Environmental Consequences/Environmental Impacts of the No Action/No Project Alternative

The No Action/No Project alternative would involve not implementing EWA asset acquisition and management actions as described in Section 2.4.2. Under the No Action/No Project alternative there would be no new construction work by either the Project Agencies or project contractors to address the reduction in water supply that would result in a loss of vegetation or wildlife habitat. The No Action/No Project alternative would not alter (increase development or slowdown development) of the other agriculture, urban development, or land management projects that would affect vegetation and wildlife habitat.

As under the Baseline Condition, during some years, project contractors may not receive their full water allocations and would respond accordingly. Agricultural interests could fallow crops, substitute crops requiring less water, or pump groundwater as a substitute water supply. Municipal agencies could use alternative sources such groundwater, seek other surface water sources, or attempt additional water conservation measures. The effects of these water measures would be the same as under the Baseline Condition and thus there would be no effects to vegetation and wildlife in the Export Service area due to the No Action/No Project Alternative.

As a potential additional response to reduced water allocations, south of the Delta interests could also seek to obtain water from north of the Delta sellers using water transfer processes similar to those described for the EWA program. If the water transfers are similar to those described in Section 10.2.6, the effects of the transfers would be similar. Because transfers involving project facilities would require individual environmental documents, the effects would be disclosed through a separate environmental review process.

No effects to Delta vegetation and wildlife habitat would occur under the No Action/No Project alternative. No actions would be taken within the Delta that could affect vegetation and wildlife relative to the reduction in water allocation, other than those actions currently in the planning stages under the CALFED program.

Within the Export Service Area, North of Delta, and Delta areas, there are a number of urban, agricultural, and habitat restoration projects either planned or being implemented that could change Baseline Conditions during the next four years. Urban developments would reduce some wildlife habitat, agricultural land conversion could increase wildlife habitat, while mitigation programs and ERP-directed programs will increase habitat in general. These future restoration projects are also expected to increase the quality, distribution, and quantity of vegetation and wildlife habitats described in Section 10.1. The success of these projects during the Stage 1 phase of CALFED currently is not known. The EWA No Action/No Project alternative will not affect the current trend in changes in plant and animal habitats within the EWA area of analysis.

Future conditions also include habitat losses caused by other projects. Some of these losses are described in the Cumulative Effects section of this chapter. (See Section 10.2.11.) Additional losses that may occur during the five-year assessment period are not currently known.

10.2.6 Environmental Consequences/Environmental Impacts of the Flexible Purchase Alternative

During portions of the year, EWA actions could raise or lower reservoir levels and increase or decrease river flows compared to the Baseline Condition. The following section describes how these changes could affect vegetation and wildlife within each community.

Additionally, as stated in Section 10.1, numerous HCPs and NCCPs have been approved or are in-progress for areas throughout the State of California. A portion of these plans cover areas outside where EWA actions would take place. For those plans that cover areas where EWA actions would take place, such as the Placer County HCP/NCCP, EWA actions would not affect the species and communities covered by the plans. EWA water acquisition and transfer actions would not involve the construction of new facilities and crop idling effects would be temporary.

10.2.6.1 Upstream from the Delta

10.2.6.1.1 Valley Riverine Aquatic/Valley Riverine Riparian

This section analyzes the EWA water acquisition and management effects on aquatic habitat and associated riparian vegetation and associated wildlife within the valley reach of each river system in the Upstream from the Delta Region. Effects would be considered significant should 1) decreases in river flows or reservoir levels reduce the water source for riparian vegetation, thereby decreasing its extent; 2) decreases in stream flow do not allow for temporary flooding of adjacent floodplain thereby inhibiting germination and growth of seedlings; 3) decreases in river flows strand populations of wildlife species (e.g., tadpoles) increasing their loss through predation; 4) increases in stream flow cause erosion of stream banks resulting in a loss of shaded riverine habitat; 5) increases in stream flows flush populations (non-volitional movement) of wildlife from protected areas or wash seedlings of riparian vegetation away from stream banks/shallow areas causing a loss in recruitment vegetation; or 6) increases and timing of flows are such that natural geomorphic processes such as point bar formation do not occur and establishment of seedlings in adversely affected.

The timing and amount of EWA water releases, will, in general, decrease mean flow peaks in early spring and increase summer water levels available for plants. Peak spring flows typically clear the river channel of debris and unclog sediments, depositing them downstream creating point bars and nutrient rich floodplains essential for early successional plant germination. Decreasing summer water levels ensure that pioneer seedlings are able to match growth with increasingly unavailable water supplies and outcompete non-pioneer species for resources. Currently, river regulation in the Central Valley has created artificially stable hydrological conditions and EWA actions would further exacerbate this trend. Affects to riparian habitat

include the loss of point bars and other substrates for seed germination and increased water supply availability during the summer allowing non-pioneer species to compete for resources once only available to pioneer species.

Another consequence of altered hydrological conditions is the presence of amphibian species in river mainstems where they were previously confined to tributaries. Dams, particularly those created for power generation have often reduced flows to such a degree that newly created slow moving water habitats attract frogs such as the foothill yellow-legged frog (FYLF). These frogs lay eggs March through May, and the tadpoles metamorphose three to four months later. Frogs at this stage are highly vulnerable to non-volitional movements because of increased flows. However, a search of the CNDDDB and current literature did not reveal any occurrences of species such as the FYLF in the mainstems of the rivers being affected by EWA actions.

The following sections provide detailed timing and flow rate discussions for each river and associated EWA actions. The effects on riparian habitats adjacent to each river and associated wildlife are the same as those just discussed, the only difference being the magnitude of the effect. The environmental measure outlined in Section 10.2.4 will ensure that effects on riparian habitat are avoided or minimized.

Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would decrease Sacramento River flows from Lake Shasta downstream to the point of diversion in June⁷. EWA acquisition of up to 120,000 acre-feet of water via groundwater substitution and up to 158,000 acre-feet from crop idling would decrease Sacramento River flows by 1,160 cfs in June. The reduction from 18,180 cfs to 17,020 cfs in June would not affect shoreline vegetation. Thus, the decrease in median monthly flows during June is less than significant.

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change Sacramento River flows downstream from Lake Shasta in April through September. EWA acquisition of up to 120,000 acre-feet of water via groundwater substitution and up to 158,000 acre-feet from crop idling would increase Sacramento River flows by 240 cfs between Lake Shasta and the point of diversion in July. Flows in this reach would decrease 133 cfs and 111 cfs in August and September, respectively. Downstream from the diversion point, flows would increase by 289 cfs, 372 cfs, 429 cfs, 1,940 cfs, 777 cfs, and 157 cfs in April through September, respectively. This represents a 1 to 11 percent increase in flow and is not considered significant to cause adverse effects.

⁷ Because of flow and temperature requirements in the Sacramento River, Lake Shasta would not be able to store EWA water from groundwater substitution and crop idling in April and May. During these months, flows in the Sacramento River would be the same as under the Baseline Condition. In some years, (depending on hydrologic conditions) Lake Shasta would store EWA water in June.

Feather River

EWA acquisition of Feather River contractor water via groundwater substitution, crop idling, and stored reservoir water would change Feather River flows downstream of Oroville Reservoir from July through September relative to the Baseline Condition. Under the Flexible Purchase Alternative, crop idling and groundwater substitution transfers would not affect flow in the lower Feather River from April through June (the hold-back period) because this water would typically have been released from the Thermalito Afterbay directly to the water agencies. Crop idling and groundwater substitution transfers would act in conjunction with Oroville-Wyandotte ID stored reservoir water transfers to increase flows in the lower Feather River from July through September. Long-term average flows in the lower Feather River below Oroville Dam during the March through October growing season would increase 2105 cfs (from 5, 896 cfs to 6,497 cfs) in July, increase 850 cfs (from 4,434 cfs to 4,515 cfs) in August, and increase 149 cfs (from 1,600 cfs to 1,421 cfs) in September compared to the Baseline Condition. These changes represent a 36 percent increase in July, a 19 percent increase in August, and a 9 percent increase in September. EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

Yuba River

EWA acquisition of Yuba County WA water via groundwater substitution would decrease Yuba River flows from the power facility discharge upstream from Englebright Dam to the users' diversion points, typically at Englebright and Daguerre Point Dams, from April to June. Yuba River flows would decrease at most by 239 cfs in late spring as farmers use groundwater for irrigation instead of surface water from New Bullards Bar Reservoir. (A total of 12 to 19 percent reduction in April through June compared to the median flow under the Baseline Condition.) EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

EWA acquisition of Yuba County WA water via stored reservoir water and groundwater substitution would increase Yuba River flows from July through September. EWA agencies acquisition of Yuba County WA stored reservoir water and Yuba River contractor water via groundwater substitution would increase Yuba River flows, downstream of Englebright Dam, from July to September relative to the Baseline Condition. Flows would increase at most by 1,005 cfs in July through September, approximately 60 percent above the Baseline Condition. While this increase would be a noticeable change, releases would be operated to maintain relatively constant flows during this time period in accordance with existing Yuba County WA operations to protect fish and the environment. This increase in flow would have the potential to increase non-volitional movement of aquatic wildlife that cannot find quieter water to remain in during periods of increase. However, species such as the California red-legged frog and foothill yellow-legged frog are not known to inhabit this reach of the Yuba River. These effects cannot be quantified, but may be considered significant adverse effects if

the EWA-related water releases are maintained at significantly higher flows for long periods of time. EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

American River

EWA acquisition of Placer County WA stored reservoir water would decrease flows in the American River compared to the Baseline Condition while the reservoir refills during winter months. During the rainy season after December, Placer County WA would refill its reservoirs, which would decrease the flow that travels downstream of French Meadows, and Hell Hole Reservoirs. These decreases would occur during the winter rainy season, and would not likely have an effect on flow downstream of Folsom Lake.

EWA acquisition of Sacramento Groundwater Authority water via groundwater substitution and Placer County WA stored reservoir water under the Flexible Purchase Alternative would increase flows in the Lower American River compared to baseline from June to December. American River flows would increase from June through December because of increased releases from Folsom Lake because of Sacramento Groundwater Authority groundwater purchase transfers and Placer County WA stored reservoir water. The change in flow is not predicted to adversely affect stream habitat.

Merced and San Joaquin Rivers

EWA acquisition of Merced ID water via groundwater substitution would increase Merced River fall flows relative to the Baseline Condition. EWA agency acquisition of Merced ID water via groundwater substitution would increase Merced River flows by a maximum of 210 cfs (from 231 to 441 cfs; 52 percent above the median) below Crocker-Huffman Dam in the fall relative to the Baseline Condition as the water is released from Lake McClure. EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

10.2.6.1.2 Montane Riverine Aquatic/Montane Riparian Habitat

The EWA program could affect Montane Riverine Aquatic habitats that are on the same rivers as the Valley Riverine Aquatic habitats, but at higher elevations. Several of the following sections include abbreviated discussions from the Valley Riverine Aquatic habitat evaluation.

Sacramento River

Montane Riverine Aquatic habitat within the EWA area of analysis on the Sacramento River occurs between approximately Red Bluff, CA and Lake Shasta.

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling under the Flexible Purchase Alternative would change Sacramento River flows from June through September. The flow changes would be the same as those described in Section 10.2.6.1.1 for Valley Riverine Aquatic habitat. The numbers represent a 1 to 11

percent increase in flow. No adverse effect to habitat is predicted due to the low changes in flow.

Feather River

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would increase Feather River flows below Sly Creek and Little Grass Valley Reservoirs to Lake Oroville in November and December. The water released from Little Grass Valley and Sly Creek Reservoirs into Lake Oroville would get diverted through Woodleaf and Forbestown tunnels to run through the corresponding power generation facilities and end up in Ponderosa Reservoir. Transfer water spills from Ponderosa Reservoir directly into Lake Oroville. Because the water transferred from Little Grass Valley and Sly Creek Reservoirs into Lake Oroville would almost entirely bypass the Feather River, there would be no effects on vegetation and wildlife.

EWA acquisition of Oroville-Wyandotte ID stored reservoir water could decrease flows in the South Fork of the Feather River during the winter. Oroville-Wyandotte ID would deliver stored reservoir water for the EWA agencies from October through December, and store it in Lake Oroville until it could be transferred through the Delta during the following summer. During the rainy season after December, Oroville-Wyandotte ID would refill its reservoirs, which would decrease the flow that travels downstream of Sly Creek and Little Grass Valley Reservoirs. The effect is not considered significant because it does not occur during the growing season for vegetation along the river.

Yuba River

Montane Riverine Aquatic habitat occurs on the Yuba River between approximately Timbuctoo Bend and New Bullards Bar Reservoir.

EWA acquisition of Yuba County WA water via stored reservoir water and groundwater substitution would decrease Yuba River flows downstream of New Bullards Bar Reservoir from April to June and increase flows from July through September. The flow changes would be the same as those described in Section 10.2.6.1.1 for Valley Riverine Aquatic habitat. The only stretch of the river that includes Montane Riverine Aquatic habitat is from Englebright Dam downstream to Timbuctoo Bend (between Englebright and Daguerre Point Dams). The increases from July through September would noticeably change river flows. The Yuba County WA would operate the system to maintain relatively constant flows during this time period in accordance with existing Yuba County WA operations to protect fish and the environment.

American River

EWA acquisition of Placer County WA stored reservoir water from French Meadows and Hell Hole Reservoirs would increase flows in the Middle Fork of the American River compared to the baseline downstream from Oxbow Power House to Folsom Lake from June to October. At a maximum, releases would increase flows from June through August relative to the Baseline Condition. Median flows downstream from Oxbow Power House (where the reservoirs' power facilities release water into the river) on the Middle Fork are 790, 793, and 776 cfs during June, July, and August, respectively. EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute

changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

EWA acquisition of Placer County WA stored reservoir water would decrease flows in the Middle Fork of the American River compared to the Baseline Condition while the reservoir refills during winter months. During the rainy season after December, Placer County WA would refill its reservoirs, which would decrease the flow that travels downstream of Oxbow Power House. These decreases would occur during the winter rainy season, and would likely not substantially decrease flows in the river.

EWA acquisition of Placer County WA stored reservoir water would decrease flows in the Middle Fork of the American River compared to the Baseline Condition while the reservoir refills during winter months. During the rainy season after December, Placer County WA would refill its reservoirs, which would decrease the flow that travels downstream of French Meadows, and Hell Hole Reservoirs.

Merced River

Montane Riverine Aquatic habitat occurs on the Merced River between approximately Merced Falls and Lake McClure.

EWA acquisition of Merced ID water via groundwater substitution would decrease Merced River summer flows and increase Merced River fall flows relative to the Baseline Condition. Merced ID would hold the EWA transfer water in Lake McClure until the fall, when it would release the water downstream. This pattern would decrease flows downstream of New Exchequer Dam in the summer by a maximum of 70 cfs, but only for the short distance between New Exchequer Dam and Lake McSwain (the typical diversion point). EWA agency acquisition of Merced ID water via groundwater substitution would increase Merced River flows in fall relative to the Baseline Condition as the water is released from Lake McClure. EWA agencies would monitor the releases to ensure that adverse effects do not occur, and institute changes to quantities of water released through adaptive management processes to avoid or minimize any adverse effect.

10.2.6.1.3 Lacustrine

Comparing EWA actions to the Baseline Condition determines project effects. Reservoirs fluctuate seasonally in response to use and hydrology; therefore, this normal fluctuation creates the Baseline Condition. EWA actions further modify these fluctuations, sometimes accentuating changes and other times attenuating changes in reservoir levels. Any change in reservoir level that could reduce the extent of riparian vegetation along the shore of the reservoir or populations of species inhabiting the shoreline environment would be significant. Chapter 9 presents the analyses of effects to fish populations inhabiting reservoir being used to store and manage EWA assets.

Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change the timing of releases from Lake Shasta. Lake Shasta would hold back at most 68,900 acre-feet that would have been released under the Baseline Condition.

The lake level would decline faster in July and August compared to the Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September. (See Figure 14-5.) Lake Shasta elevation would be 1.1 feet lower in July, 0.5 of a foot lower in August, and equal to the Baseline Condition in September. These small changes of less than 0.5 inches per day would not be enough to affect the lacustrine habitat within the lake or surrounding the lake perimeter. The water source for riparian vegetation will not be affected and the upland scrub vegetation surrounding the reservoir does not rely on the reservoir for its water source. Therefore, the change in Lake Shasta water surface elevation would have a less-than-significant effect on the lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the water edge.

Feather River

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would decrease surface water elevations from December until refill for Sly Creek and Little Grass Valley Reservoirs. Little Grass Valley and Sly Creek Reservoirs could release a combined maximum of 15,000 acre-feet of water from October to December (a maximum of 12,000 acre-feet from Little Grass Valley and a maximum of 5,000 acre-feet from Sly Creek Reservoir). Reservoir levels within Little Grass Valley would decrease approximately 12 feet because of the maximum potential release. Reservoir levels within Sly Creek Reservoir would decrease approximately 17 feet because of the maximum potential release. These reductions would not affect shoreline vegetation because this vegetation is not dependent upon reservoir levels for water (the shore-line vegetation is not riparian, it is associated with upland scrub that is not dependent on saturated soil for water). In addition, Sly Creek and Little Grass Valley reservoir water levels fluctuate seasonally and annually; therefore, the drawdown zone is vegetated primarily with non-native herbaceous plants and scattered willow shrubs that do not form a contiguous riparian community and would not be affected by decreases in reservoir levels caused by EWA actions (CALFED 1998). Therefore, the EWA agencies' acquisition of Oroville-Wyandotte ID stored reservoir water would have a less-than-significant effect on the lacustrine habitat of Sly Creek and Little Grass Valley reservoirs used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries.

EWA acquisition of Feather River contractor water via crop idling and groundwater substitution would increase the surface water elevation April to June and decrease the surface water elevation in July and August in Lake Oroville compared to the Baseline Condition. EWA agencies would acquire 110,000 acre-feet through groundwater substitution and 126,550 acre-feet through crop idling. During April through June, Lake Oroville would hold back water that would have been released under the Baseline Condition. By the end of June, the surface water elevation in the reservoir would be, at most, two feet higher than under Baseline Conditions. (See Figure 14-8.) Increased releases in July and August as the stored EWA water is released for cross-Delta transfer would cause the lake level to decline faster compared to Baseline Conditions; however, reduced releases in September would allow end of month elevation in September to

be the same as Baseline Conditions. The increase water surface elevation would result in increased flooding of shoreline habitat. The increased level would come slowly (less than an inch per day) so that wildlife would not be affected and riparian vegetation are accustomed to flooding and will not be adversely affected. Therefore, the change in Lake Oroville water surface elevation would have less-than-significant effects on the lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the shoreline.

Yuba River

EWA acquisition of water from Yuba County Water Agency (Yuba County WA) via stored reservoir water and groundwater substitution would alter the surface water elevation April to refill at New Bullards Bar Reservoir. EWA agencies would acquire 85,000 acre-feet through groundwater substitution. During April through June, New Bullards Bar Reservoir would hold back water that would have been released under the Baseline Condition. By the end of June, the surface water elevation in the reservoir would be, at most, 5 feet higher than under the Baseline Condition. (See Figure 14-9.) An increase in the surface water elevation would only inundate the existing drawdown zone and would not affect vegetation and wildlife.

Yuba County WA would not enter into a transfer agreement unless local needs, instream flows, and system demand requirements were met. If these elements were met, EWA agencies could acquire water during July through September. Releases from New Bullards Bar Reservoir would be, at a maximum, 100,000 acre-feet of water from stored reservoir water and 85,000 acre-feet from groundwater substitution. The combination of these releases would reduce lake levels compared to the Baseline Condition by 1 foot, 10 feet, and 24 feet in July, August, and September, respectively. This reduction would not affect shoreline vegetation because this vegetation is not dependent upon reservoir levels for water (the shoreline vegetation is not riparian, it is associated with upland scrub that is not dependent on saturated soil for water). In addition, New Bullards Bar Reservoir water levels fluctuate seasonally and annually; therefore, the drawdown zone is vegetated primarily with non-native herbaceous plants and scattered willow shrubs that do not form contiguous riparian communities and would not be affected by decreases in water levels caused by EWA actions (CALFED 1998). Therefore, the EWA agency acquisition of Yuba County Water Agency water would have less-than-significant effects on the lacustrine habitat of New Bullards Bar Reservoir used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the shoreline.

The EWA agencies and Yuba County WA could agree to transfer water under a multi-year contract. If full refill occurred, which it has for 85 percent of the past transfers, effects on vegetation and wildlife for subsequent years would be the same as described above. If full refill did not occur, Yuba County WA would consider selling less water the following year.

American River

EWA acquisition of Placer County Water Agency stored reservoir water would decrease surface water elevations June to refill at Hell Hole and/or French Meadows Reservoirs. Hell

Hole Reservoir and French Meadows Reservoir would release a combined maximum of 20,000 acre-feet of water. The amount released from each reservoir would be at the discretion of Placer County Water Agency; however, this analysis assumes that releases would be in proportion to the sizes of the reservoirs (61 percent from Hell Hole, the remainder from French Meadows). Releases of reservoir water from French Meadows and Hell Hole could begin as early as June and end as late as October. For the purposes of this analysis, releases were assumed to take place between July and September. Using these assumptions, French Meadows would release 7,800 acre-feet, decreasing water surface levels by approximately eight feet. Hell Hole would release 12,200 acre-feet decreasing water surface levels by 14 feet. These reductions would not affect shoreline vegetation because this vegetation is not dependent upon reservoir levels for water. In addition, French Meadows and Hell Hole Reservoir water levels fluctuate seasonally and annually; therefore, the drawdown zones are vegetated primarily with non-native herbaceous plants and scattered willow shrubs that do not form a contiguous riparian community and would not be affected by decreases in reservoir levels caused by EWA actions (CALFED 1998). Therefore, the EWA agency acquisition of stored reservoir water and the decrease in surface water elevations at French Meadows and Hell Hole Reservoirs would have a less-than-significant effect on lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the shoreline.

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase and Placer County WA's water via stored reservoir water would change surface water elevations in Folsom Lake. During July and August, the surface water elevation at Folsom Lake would be 0.8 of a foot lower than the Baseline Condition. The lake level would decline faster in July and August compared to the Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September. (See Figure 14-12.) Therefore, the change in Folsom Lake surface water elevations would have less-than-significant effects on lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries.

Merced River

EWA acquisition of Merced ID water via groundwater substitution would increase the water surface elevation in Lake McClure compared to the Baseline Condition. EWA agencies could acquire 25,000 acre-feet through groundwater substitution. During April through September, Lake McClure would hold back water that would have been released under the Baseline Condition. By the end of September, the surface water elevation in the reservoir would be, at most, three feet higher than under Baseline Conditions. (See Figure 14-13.) This increase would occur slowly over the six-month period, less than 0.5 inches per day. The increase would not flood sensitive habitats or nesting areas. Therefore, the change in Lake McClure surface water elevations would have a less-than-significant effect on lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the shoreline.

10.2.6.1.4 Nontidal Freshwater Permanent Emergent

EWA acquisition of water via groundwater substitution transfers in the Upstream from the Delta Region could lower groundwater levels. As a part of groundwater substitution transfers, the willing sellers would pump additional groundwater resulting in a decreased use of surface water. Pumping additional groundwater would decrease groundwater levels in the vicinity of the sellers' pumps. Some areas of Nontidal Freshwater Permanent Emergent habitat have groundwater as a source of water, and decreasing groundwater levels could reduce the supplies for these habitats thereby drying up the habitat.

Chapter 6, Groundwater Resources, analyzes in detail how groundwater substitution transfers could affect groundwater levels and surrounding beneficial users, including the environment. The section concludes that these effects could be potentially significant, and requires several measures. These measures would require monitoring to identify if any effects are occurring, and implementation of additional mitigation by the seller if any effects should occur. The additional mitigation steps could be cessation of pumping or use of a replacement water source for the affected area. Because the mitigation involves monitoring and the effect may only be determined after the drying of a habitat is observed, groundwater substitution has the potential for a significant effect on nontidal permanent emergent wetlands. The degree of that effect will be dependent on how soon the effect is noted and the response by the willing seller to mitigate that effect. Implementation of Environmental Measures in Section 10.2.4 will reduce this effect to a less-than-significant level.

10.2.6.1.5 Natural Seasonal Wetland

EWA acquisition of water via groundwater substitution transfers in the Upstream from the Delta Region could lower groundwater levels. As a part of groundwater substitution transfers, the willing sellers would use groundwater to irrigate crops and decrease use of surface water. Pumping additional groundwater would decrease groundwater levels in the vicinity of the sellers' pumps. Some areas of Natural Seasonal Wetland habitat have groundwater as a source of water, and decreasing groundwater levels could reduce the water base for these habitats.

Chapter 6, Groundwater Resources, analyzes in detail how groundwater substitution transfers could affect groundwater levels and surrounding beneficial users, including the environment. The section concludes that these effects could be potentially significant, and requires several measures. These measures would require monitoring to identify if any effects are occurring, and implementation of additional measures by the seller if any effects should occur. The additional mitigation steps could be cessation of pumping or use of a replacement water source for the affected area. Because the mitigation involves monitoring and the effect may only be determined after the drying of a habitat is observed, groundwater substitution has the potential for a significant effect on natural seasonal wetlands. The degree of that effect will be dependent on how soon the effect is noted and the response by the willing seller to mitigate that effect. Implementation of Environmental Measures in Section 10.2.4 will reduce this effect to a less-than-significant level.

10.2.6.1.6 *Managed Seasonal Wetland*

Groundwater substitution and crop idling actions could have adverse effects on managed seasonal wetlands by reducing the water supply to these areas. The project effects on managed seasonal wetlands would be the same as for the nontidal emergent and natural seasonal wetland communities due to their potential association with high groundwater tables. The groundwater substitution mitigation strategy would also apply to this community. Effects to the community would be considered significant if the willing seller does not mitigate for the loss of the water source for this community.

In addition, both groundwater substitution and crop idling actions could result in less water in agriculture supply and return flow ditches, potentially resulting in the desiccation of managed seasonal wetlands. The sections below analyze potential project effects on agricultural water supplies caused by these two EWA actions.

Groundwater Substitution Transfers in the Sacramento Valley

Groundwater substitution transfers would decrease flows in agricultural delivery ditches. When water agencies agree to sell water to the EWA agencies through groundwater substitution transfers, the water agencies will identify the specific farms within each area participating in the idling action. The water sellers then forgo their surface water supplies and substitute water supplies with groundwater. This change results in less diversion into the agricultural delivery system, which could affect species within the delivery ditches. This decrease is likely to adversely affect the species and vegetation that depend on this flow; therefore, this effect is potentially significant. Measures in Section 10.2.4 would reduce effects to a less-than-significant level.

Crop Idling Transfers

The effects of crop idling transfers on managed seasonal wetlands depend on the location of the transfers. The following section is divided by river system to fully explain these potential effects.

EWA acquisition of Sacramento River water via crop idling would reduce the water supply for managed seasonal wetlands that rely on return flows from fields that would be idled. Glenn, Colusa, and Yolo Counties could idle up to 47,980 acres. The EWA agencies would purchase approximately 3.3 acre-feet per acre (the amount of water consumed by the crop); however, under the Baseline Condition, water agencies divert additional water from the Sacramento River to account for system losses. System losses include conveyance losses (evaporation or percolation within the conveyance system), riparian evapotranspiration (water used by vegetation along the conveyance system), and on-farm losses (deep percolation to groundwater or tailwater runoff). The amount of water diverted varies depending on the amount of system losses.

If farmers idled their crops, their water agency would reduce diversions by the 3.3 acre-feet per acre plus the additional amount that goes to on-farm losses. Of this additional amount that is applied to fields in the Baseline Condition, a portion percolates into the groundwater aquifer below and a portion runs off the field back into the conveyance system. This "tailwater" that runs back into the conveyance

system could then be used again by managed wetlands downstream on the conveyance system. If farmers idled land, tailwater would no longer be available to downstream users, either other farmers or managed wetlands.

Few managed seasonal wetlands exist downstream of the water agencies that may sell water to the EWA agencies via crop idling. The effects on these wetlands because of the reduction of return flows, however, could be potentially significant. The environmental measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

EWA acquisition of Feather River water via crop idling would reduce the water supply for managed seasonal wetlands that rely on the return flows from fields that would be idled. Butte and Sutter Counties could idle up to 38,340 acres. As described above for the Sacramento River, idling these fields would reduce tailwater, which could reduce supplies to downstream wetlands. Several of the agencies within Butte and Sutter Counties discharge return flows from the irrigation systems into Butte Creek, which provides water for several managed seasonal wetlands. The reduction in return flows could have potentially significant effects on these managed seasonal wetlands. The environmental measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

EWA acquisition of American River water via crop idling would reduce the water supply for managed seasonal wetlands that rely on return flows from fields that would be idled. Placer County could idle up to 3,280 acres. As described above for the Sacramento River, idling these fields would reduce tailwater, which could reduce supplies to downstream wetlands. The reduction in return flows could have potentially significant effects on managed seasonal wetlands. The environmental measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

10.2.6.1.7 Seasonally Flooded Agriculture

Crop idling would reduce the rice acreage in the Sacramento Valley. Table 10-4 displays SFA acreage and waste grain reduction for the maximum acreage of crop idling anticipated for all counties where idling action could occur for the EWA program. These numbers reflect the maximum water transfers (for all water programs acquiring water through crop idling) based on the project limitation of 20 percent maximum crop acreage idled per county. Idling this acreage would reduce the extent of habitat available to those special-status species dependent upon SFA for some portion of their lifecycle (identified with an * in Table 10-3), which would result in potentially significant effects to those species. Section 10.2.4 proposes environmental measures to help minimize any adverse effects to special-status species.

Table 10-4 also displays the reduction in the availability of waste grain as forage to wildlife by county and total for all crop idling actions (depending on agricultural practices). This amount would result in a potentially significant effect to those special-status species dependent upon waste grain for a large portion of their forage

(identified with an * in Table 10-3). Section 10.2.4 proposes environmental measures to help minimize any adverse effects to special-status species.

Associated with the idling of SFA is the potential loss of water within adjacent irrigation and return ditches in all six counties. EWA water would not enter water agencies' distribution systems because it is no longer being delivered to the agricultural users, and unused flows from the fields would not return to the delivery system. These changes have the potential to reduce flow in these ditches, thereby reducing the value of habitat provided. Some irrigation ditches provide forage, resting, and nesting habitat and serve as migration corridors. Devaluing or losing this habitat could affect giant garter snakes, herons, egrets, western pond turtles, etc. This decrease to water in agricultural ditches is a potentially significant effect to these special-status species. Section 10.2.4 proposes environmental measures to help minimize any adverse effects to special-status species.

Table 10-4
Seasonally Flooded Agriculture Acreage and Waste Grain Reductions in Each County
Based on Crop Idling Maximum Purchases under the Flexible Purchase Alternative

	Rice Acreage (97 Ag Census) (AC)	Maximum Idled Acreage (AC)	Maximum Percent Rice Acreage (%)	Waste Grain per Acre (lbs)	Total Waste Grain (million lbs)	Maximum Waste Grain Loss (million lbs)	Maximum Percent Waste Grain Loss (%)	Maximum Total Acre-Feet of Water Available for EWA Fish Actions (TAF)	Maximum Potential Square Miles Idled
Butte	95,120	19,000	20%	350	33.3	6.6	20%	62.7	30
Colusa	132,338	26,460	20%	350	46.3	9.2	20%	87.3	41
Glenn	83,777	16,750	20%	350	29.3	5.7	20%	55.2	26
Placer	16,379	3,280	20%	350	5.7	1.1	20%	10.8	5
Sutter	96,722	19,340	20%	350	33.9	6.8	20%	63.8	30
Yolo	23,822	4,770	20%	350	8.3	1.7	20%	15.7	7
Total	448,158	89,608	20%	350	156.9	31.1	20%	295.7	140

Associated with the idling of SFA is the potential for fragmentation of seasonally flooded agriculture land habitat. Assuming the maximum acreage is idled (20 percent of rice within each county), a total of 140 square miles of formerly flooded land would be dry in all six counties over the late spring, summer, and early fall months. This impact would be significant if it occurred as one contiguous block of SFA. The idled land would have the potential to interfere with wildlife migration and the dispersal of individuals within a metapopulation (hence a loss of genetic diversity). The inability of a snake to migrate to more suitable habitat would potentially be a significant effect to this special-status species, especially those populations that are succumbing to other population pressures. Section 10.2.4 identifies environmental measures intended to reduce the significant effects to species utilizing SFA for an important part of their life cycle.

Also associated with idling SFA is the potential to affect wildlife, in particular special-status species. The following text provides a summary of the special-status species assessment conducted in the EWA ASIP. Table 10-5 provides the relationship of special-status species associated with rice lands and the rice production cycle.

10.2.6.1.8 Aleutian Canada Goose

Aleutian Canada Goose Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing winter forage and habitat for this recovering species. The Aleutian Canada goose is a winter visitor to the Central Valley. The primary cause of its population decline was the introduction of foxes to its breeding islands in Alaska. A recovery plan (USFWS 1991a) has been put in place to address the threat predators pose to its breeding habitat. The concern for its winter use in California is to ensure the survival of the over wintering populations as measure of addressing the species overall recovery.

Like many migratory waterfowl, the Aleutian Canada goose forages on waste grain on agricultural fields in the Colusa Basin. This includes flooded rice land and rice land stubble. In addition to waste grains, the birds also consume insects and vegetative matter.

The concern for SFA idling is a reduced winter food supply for the Aleutian Canada goose. However, the analysis of waterfowl population trends for the Central Valley (Figure 10-4) shows no correlation between the amount of waste grain and waterfowl numbers. It appears that waste grain is not a limiting factor for controlling waterfowl populations and therefore the reductions of winter forage resulting from EWA crop idling would have a less-than-significant effect on the species. No environmental measure for the Aleutian Canada goose related to reduction in winter forage is proposed.

Crop idling actions taken by EWA agencies would have less-than-significant effects on the Aleutian Canada goose.

10.2.6.1.9 Black Tern

Black Tern Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing breeding habitat and summer habitat for this special status species. The black tern was once a common spring and summer visitor to the emergent wetlands of the Central Valley, but its numbers have declined due to habitat losses. Although restricted to freshwater habitats for breeding, it migrates to bays, rivers, and pelagic waters the remainder of the year. SFA habitat has partially replaced the lost emergent vegetation breeding habitat for this species. The rice production cycle coincides with the tern's seasonal behavior in two ways: 1) fields are flooded during the tern's Central Valley breeding season, and 2) fields are dry when the birds have migrated to other aquatic habitats.

Table 10-5
Relationship of Special-Status Species Associated to Rice Land Crop Cycles

Annual Cycles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice Fields Status	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded or draining in Sacramento Valley)*	Generally draining and drying in preparation for planting*	Generally flooded*	Generally flooded*	Flooded	Flooded	Draining and harvesting	Draining and harvesting	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)
Giant Garter Snake	Snakes are dormant.	Snakes are dormant.	Snakes emerge. Riceland provides canals with emergent vegetation for cover and for locating mates.	Snakes emerge. Riceland provides canals with emergent vegetation for cover and for locating mates.	Snakes remain close to their denning areas.	Snakes move throughout flooded rice land habitat. Rice land provides warm shallow open waters with aquatic prey for foraging.	Snakes move throughout flooded rice land habitat and start birthing. Rice land provides emergent vegetation for birthing and juvenile dispersion cover.	Snakes move throughout flooded rice land habitat and continue birthing. Rice land provides emergent vegetation for birthing and juvenile dispersion cover.	Snakes complete birthing and leave rice land area to concentrate in drainage ditches and irrigation canals. Rice land provides concentrated prey within canals	Snakes are concentrating in drainage ditches and irrigation canals. Rice land provides drainage pools of concentrated prey for pre-dormancy gorging.	Snakes are dormant.	Snakes are dormant.
Tricolored Blackbird	Birds winter in pastureland and other habitat. Some flocks use shallow open waters for foraging on aquatic insects and plants if fields are flooded and barren fields for foraging on waste grain.	Birds winter in pastureland and other habitat. Some flocks use shallow open waters for foraging on aquatic insects and plants if fields are flooded and barren fields for foraging on waste grain.	Birds initiate breeding in habitats adjacent to rice lands. Some foraging may continue in residual flooded fields/inactive fields on aquatic insects and waste grain.	Birds are breeding in habitats adjacent to rice lands. Rice lands in planting stage typically provide no significant resource.	Birds are breeding in habitats adjacent to rice lands. Rice land resources include shallow open waters for foraging on aquatic insects and emergent plants.	Birds are breeding in habitats adjacent to rice lands. Rice land resources include shallow open waters for foraging on aquatic insects and emergent plants.	Birds are breeding in habitats adjacent to rice lands. Rice land resources include shallow open waters for foraging on aquatic insects and emergent plants.	Birds are breeding in habitats adjacent to rice lands. Rice land resources include shallow open waters for foraging on aquatic insects and emergent plants.	Birds finish breeding and are dispersing to a variety of habitats. Waste grain becomes available for foraging.	Birds finish breeding and are dispersing to a variety of habitats. Waste grain becomes available for foraging.	Birds winter in pastureland and other habitat. Some flocks use shallow open waters for foraging on aquatic insects and plants if fields are flooded and barren fields for foraging on waste grain.	Birds winter in pastureland and other habitat. Some flocks use shallow open waters for foraging on aquatic insects and plants if fields are flooded and barren fields for foraging on waste grain.

Table 10-5
Relationship of Special-Status Species Associated to Rice Land Crop Cycles

Annual Cycles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice Fields Status	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded or draining in Sacramento Valley)*	Generally draining and drying in preparation for planting*	Generally flooded*	Generally flooded*	Flooded	Flooded	Draining and harvesting	Draining and harvesting	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)
Greater Sandhill Crane	Crane is wintering. Rice land resources include dry and barren rice fields with rice stubble for foraging/cranes avoid flooded fields.	Crane is wintering. Rice land resources include dry and barren rice fields with rice stubble for foraging.	Crane migrates to breeding habitat in Northern California.	Crane breeds in Northern California.	Crane breeds in Northern California.	Crane breeds in Northern California.	Crane breeds in Northern California.	Crane breeds in Northern California.	Crane breeds in Northern California.	Crane begins returning to winter habitat, typically to the same location each year.	Crane is wintering. Rice land resources include dry and barren rice fields with rice stubble for foraging.	Crane is wintering. Rice land resources include dry and barren rice fields with rice stubble for foraging.
Great and Snowy Egrets and Heron	Egrets are wintering. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are wintering. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are wintering. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are breeding in rookeries. Rice lands during planting typically provide no significant resource.	Egrets are breeding in rookeries. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are breeding in rookeries. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are breeding in rookeries. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are breeding in rookeries. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are breeding in rookeries. Rice lands during harvesting typically provide no significant resource.	Egrets are wintering. Rice lands during harvesting typically provide no significant resource.	Egrets are wintering. Rice land resources include shallow open waters for foraging on small fish and invertebrates.	Egrets are wintering. Rice land resources include shallow open waters for foraging on small fish and invertebrates.

Table 10-5
Relationship of Special-Status Species Associated to Rice Land Crop Cycles

Annual Cycles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice Fields Status	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded or draining in Sacramento Valley)*	Generally draining and drying in preparation for planting*	Generally flooded*	Generally flooded*	Flooded	Flooded	Draining and harvesting	Draining and harvesting	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)
White-faced Ibis	Ibis is wintering. Rice land resources include shallow open waters for foraging on aquatic insects and invertebrates if fields are winter-flooded and barren fields for foraging on terrestrial or aquatic insects and invertebrates if fields are inactive.	Ibis is wintering. Rice land resources include shallow open waters for foraging on aquatic insects and invertebrates if fields are winter-flooded and barren fields for foraging on terrestrial or aquatic insects and invertebrates if fields are inactive.	Ibis is wintering. Rice land resources include shallow open waters for foraging on aquatic insects and invertebrates if fields are winter-flooded and barren fields for foraging on terrestrial or aquatic insects and invertebrates if fields are inactive.	Ibis is migratory and is breeding mostly in areas apart from rice lands.	Ibis is migratory and is breeding mostly in areas apart from rice lands.	Ibis is migratory and is breeding mostly in areas apart from rice lands.	Ibis is migratory and is breeding mostly in areas apart from rice lands.	Ibis is migratory and is breeding mostly in areas apart from rice lands.	Ibis is migrating. Rice lands during harvesting typically provide no significant resource.	Ibis is wintering. Rice lands during harvesting typically provide no significant resource.	Ibis is wintering. Rice land resources include shallow open waters for foraging on aquatic insects and invertebrates if fields are winter-flooded and barren fields for foraging on terrestrial or aquatic insects and invertebrates if fields are inactive.	Ibis is wintering. Rice land resources include shallow open waters for foraging on aquatic insects and invertebrates if fields are winter-flooded and barren fields for foraging on terrestrial or aquatic insects and invertebrates if fields are inactive.
Long-billed Curlew	Curlew is wintering. Rice land resources for the curlew include shallow open waters for foraging on invertebrates.	Curlew is wintering. Rice land resources for the curlew include shallow open waters for foraging on invertebrates.	Curlew is wintering. Rice land resources for the curlew include shallow open waters for foraging on invertebrates.	Curlew moves to breeding areas with elevated grasslands.	Curlew breeds in elevated grasslands.	Curlew breeds in elevated grasslands.	Curlew breeds in elevated grasslands.	Curlew breeds in elevated grasslands.	Curlew breeds in elevated grasslands.	Curlew returns. Rice lands during harvesting typically provide no significant resource.	Curlew is wintering. Rice land resources include shallow open waters for foraging on invertebrates.	Curlew is wintering. Rice land resources include shallow open waters for foraging on invertebrates.

Table 10-5
Relationship of Special-Status Species Associated to Rice Land Crop Cycles

Annual Cycles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice Fields Status	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded or draining in Sacramento Valley)*	Generally draining and drying in preparation for planting*	Generally flooded*	Generally flooded*	Flooded	Flooded	Draining and harvesting	Draining and harvesting	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)
Black Tern	Tern over winters in South America	Tern over winters in South America	Tern over winters in South America	Terns begin to return to California and initiate breeding in habitats other than rice land. Rice land during planting typically provides no significant resource.	Tern is breeding and can start using flooded rice land for foraging on insects and invertebrates.	Tern is breeding and is using flooded rice land emergent vegetation for nesting and for foraging on insects and invertebrates.	Tern is breeding and is using flooded rice land emergent vegetation for nesting and for foraging on insects and invertebrates.	Tern ends breeding. Rice land resources include shallow open waters and emergent vegetation for foraging on insects and invertebrates.	Terns begin to disperse from riceland	Tern migrates to South America	Tern over winters in South America	Tern over winters in South America
Black-crowned Night Heron	Heron is wintering. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates if fields are flooded.	Heron initiate breeding in trees possibly near rice land. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates if fields are flooded.	Heron is breeding. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates if fields are flooded.	Heron is breeding. Rice lands during planting typically provide no significant resource.	Heron is breeding. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates.	Heron is breeding. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates.	Heron completes breeding. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates.	Heron is roosting in trees more remote from rice land. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates.	Heron is roosting. Rice lands during harvesting typically provide no significant resource to Herons	Heron is roosting. Rice lands during harvesting typically provide no significant resource to Herons	Heron is wintering. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates if fields are flooded.	Heron is wintering. Rice land resources include shallow open waters for foraging on aquatic insects, small fish, and invertebrates if fields are flooded.

Table 10-5
Relationship of Special-Status Species Associated to Rice Land Crop Cycles

Annual Cycles	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rice Fields Status	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded or draining in Sacramento Valley)*	Generally draining and drying in preparation for planting*	Generally flooded*	Generally flooded*	Flooded	Flooded	Draining and harvesting	Draining and harvesting	Inactive (40% flooded in Sacramento Valley)	Inactive (40% flooded in Sacramento Valley)
Western Pond Turtle	Turtles are dormant.	Turtles are dormant.	Turtles become active. Rice land resources include emergent vegetation in canals and drainage ditches for cover and for foraging on aquatic plants and invertebrates and dikes for basking.	Turtles are active. Rice land resources include emergent vegetation in canals and drainage ditches for cover and for foraging on aquatic plants and invertebrates and dikes for basking.	Female turtles begin moving to upland nest sites. Rice land resources include emergent and wet irrigation canals and drainage ditches for cover and for foraging on aquatic plants and invertebrates and dikes for basking.	Female turtles move to upland nest sites. Rice land resources include emergent vegetation in canals and fields for cover and for foraging and dikes for basking.	Female turtles complete nesting. Rice land resources include emergent vegetation in canals and fields for cover and for foraging and dikes for basking.	Turtles are active in fields and canals. Juveniles begin to hatch but remain at the nests, usually until March	Turtles are active. Turtles move into drainages and canals with emergent vegetation and cover and for foraging on aquatic plants and invertebrates.	Turtles are active. Remain in drainages and canals with emergent vegetation until hibernation. Canals have concentrated prey to prepare for hibernation.	Turtles are dormant.	Turtles are dormant.

* The determination of when field preparation initiates is dependent on the last significant rainfall. If rainfall ends in March, field prep can start in April, if rain extends into May, field preparation may wait until early June..

The black tern forages by hovering above wet meadows and emergent wetlands, catching insects in the air and diving into the water to capture tadpoles, crayfish, small fish, and mollusks. It nests in loose mats of dead vegetation on the ground or anchored to other vegetation. In rice fields, the tern can also nest on dikes that separate the fields.

Because this species uses SFA for nesting and forage, a reduction of rice habitat could be detrimental to local populations. As an environmental measure, idling of rice habitat known to support colonies of black terns should be avoided. The EWA agencies will review maps of areas proposed for EWA water acquisition crop idling for the presence of the nearest colony. Fields supporting colonies will not be idled. The environmental measures in Section 10.2.4 would reduce effects on the black tern to less than significant.

10.2.6.1.10 Black-Crowned Night Heron

Black-Crowned Night Heron Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley affecting roosting habit and reducing forage for this special status species. The black-crowned night heron is a fairly common, yearlong resident of lowlands and foothills in California. It nests and roosts in dense tree foliage. Nesting roosts are typically near water, but non-breeding roosts can be some distance from water. Unlike other herons, the black-crowned night heron feeds primarily at night. It has a highly variable diet consisting of fish, crustaceans, aquatic insects, and other invertebrates, amphibians, and small mammals. There are reports of black-crowned night herons raiding bird colonies, including terns and tricolored black birds.

SFA habitat is just one of the many habitats used by the black-crowned night heron. These birds commonly fly up to three miles from their roosts to their feeding areas. Although idling of rice fields may reduce some forage available to the heron, the heron has no particular affinity to this habitat. The only effect would be to those herons, which have incorporated rice into their foraging routine. If insufficient forage is present within idled rice fields, the black-crowned night heron has the ability to forage elsewhere. The heron's roosting sites are not dependent on rice farmland practices and will not be affected by crop idling actions. The EWA program would have a less than significant effect on the black-crowned night heron.

10.2.6.1.11 Great Blue Heron, Great Egret, Snowy Egret

Great Blue Heron, Great Egret, Snowy Egret Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley affecting roosting habit and reducing forage for these special status species. These three species are included in one assessment because of coinciding roosting and feeding habits. In the Central Valley, all three species roost communally in trees in riparian areas, and feed commonly in shallow water, along shorelines, irrigation ditches, and other water bodies that contain fish, amphibians, insects, crustaceans, small mammals, and similar prey items. The species will readily abandon nesting attempts if disturbed. Destruction of riparian habitat and roosting trees is therefore a major concern for all of these species.

These species typically “commute” daily from their overnight roosting sites to their feeding areas. All species typically travel from one to five miles from the roosting site to the feeding locations. For seasonally flooded agricultural land (rice farmland), these species utilize both the rice fields and associated irrigation ditches. In relation to the rice cycle, the flooded fields during the summer and the irrigation ditches during the fall provide ample aquatic and insect prey. (See Section 10.1.1.14.) The dry fields during fall and spring, and partially flooded fields during the winter provide for some insect prey. None of the species rely on waste grain (except for the insect populations the grain may support) and thus absence of waste grain is not a concern for the species as it is for other avian species.

Idling of rice farmland for a season has the potential to reduce some summer and fall forage for egrets and herons that roost within 5 miles of the idling action. Because the birds will travel long distances to forage and because environmental measures for the giant garter snake will provide for the maintenance of aquatic habitat in rice growing areas, the only effect on these species is a potential change in forage patterns from idled fields to fields with abundant prey. Idling of rice farmland will not affect roosting sites; there is less human activity because no farming is occurring. Therefore, effects would be less than significant and no environmental measures are proposed.

10.2.6.1.12 Greater Sandhill Crane

Greater Sandhill Crane Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley thereby reducing winter forage for this special status species. The Central Valley Population of the sandhill crane is one of five populations in North America (Littlefield et al. 1994). It is comprised of 6000-6800 individuals, among which 3400 breed in the southern segment of its range, which includes northeast California, outside of the EWA area of analysis. The entire population winters in the Central Valley (Littlefield and Thompson 1979), and from 1983-1984, 95percent wintered from Sacramento Valley south to the Bay-Delta (Pogson and Lindstedt 1991).

The greater sandhill crane uses harvested rice fields in the Sacramento Valley for wintering habitat and forage from October to February (Littlefield 1993). It also uses grain fields in the Delta. The time period that cranes over winter also corresponds to the time when rice land is being harvested (October) and then becomes inactive. The greater sandhill crane prefers rice stubble that has not been flooded to decompose the vegetative materials. Burning or flooding to manage harvested rice stubble has contributed to the reduction of portions of the crane’s wintering habitat (Littlefield 1993).

The greater sandhill crane typically returns to the same location each year to winter. Crop idling of seasonally flooded agricultural land used for rice production in the areas to which the cranes return will affect their wintering distribution patterns due to reduced forage on the idled fields. Although the cranes will disperse from their core areas as winter food resources diminish, crop idling could affect this change earlier. Avoiding crop idling in the core areas could minimize this effect to crane populations. Environmental measures in Section 10.2.4 would reduce this effect to a less-than-significant level.

10.2.6.1.13 Long-billed Curlew

Long-billed Curlew Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing winter forage for this special status species. The long-billed curlew is a common winter visitor to the Central Valley where it forages on upland herbaceous plants and croplands. Some non-breeding individuals remain in the Central Valley during the summer. Breeding habitat is located in upland prairie grassland habitat outside of the EWA area of analysis. Winter migrants can arrive as early as June and most leave the valley by April. The primary food prey items of the curlew in the Central Valley are estuarine fish, insects, worms, spiders, crayfish, snails, and small crustaceans. Curlews “display no consistent season-specific food item preferences or limitations” (NRCS 2000). Therefore, during the winter curlews would take advantage of flooded or dry rice fields as long as adequate prey is available. The idling of seasonally flooded agricultural land would reduce some insect forage areas for the species (assuming the idled cropland produces less insects), but curlews would respond by looking for forage in other habitats. This effect is considered less than significant and no environmental measure is proposed for this species.

10.2.6.1.14 Tricolored Blackbird

Tricolored Blackbird Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing summer forage and breeding colonies for this special status species. The tricolored blackbird is an inhabitant of the Sacramento-San Joaquin Delta and central coast of California in the winter and typically migrates to breeding locations near open freshwater in Sacramento County and throughout the San Joaquin Valley in the spring (Dehaven et al. 1975). In addition to insects and seeds, the tricolored blackbird forages on cultivated grains such as rice on croplands and flooded fields, and waste grain rice following the harvest (Zeiner et al. 1990). One study showed that rice constituted up to 38 percent of the annual diet of tricolored blackbirds (Crane and DeHaven 1978), but most reports indicate that insects can make up to 90 percent of their diets in the summer shifting to 88 percent vegetative matter in the winter.

Tricolored blackbirds generally breed from March to July, but have been observed breeding in the Sacramento Valley in October and December. In some years there may be up to three attempts at breeding, particularly if a colony is disturbed during an earlier attempt. Although the primary cause for the overall decline in tricolored blackbird populations is due to loss of wetland habitat to agriculture and urban development, the current threat to the population is predation by mammalian and avian predators and the destruction/disturbance of breeding colonies. Tricolored blackbirds can breed in large colonies, with over 100,000 birds being reported for some colonies.

Tricolored blackbirds have three basic requirements for selecting breeding colony sites (Beedy and Hamilton, 1997): 1) open accessible water; 2) protected nesting substrate, usually either flooded or thorny or spiny vegetation; and 3) suitable foraging space providing adequate insect prey within a few kilometers of the nesting colony. Rice fields can provide two of the three requirements (water and insects), but

the adjacent vegetation is usually not sufficiently shrubby and the emergent rice plants are not tall and strong enough to support nests, at least during the time when initial nesting is being attempted. Colonies have been rarely observed in rice fields (USFWS 1999), but can use emergent vegetation in canals associated with rice fields. The rice agriculture cycle provides insect forage in the flooded fields during the summer and waste grain forage over winter.

Tricolored black birds do not necessarily return to the same location each year to breed and can vary location between season or within a season. Because the birds have specific breeding habitat requirements and there are limited areas available for breeding, colonies are typically found in the general vicinity of the previous years colony, if the same site is not being used.

The primary concern for the tricolored blackbird's association with rice fields is the use of the habitat as a source of insects and waste grain forage. The birds are highly mobile and fly up to 3 miles from the colony site to forage. During the winter, the birds are more nomadic and move from pastureland and dairy farms to feed, primarily on vegetative matter. The idling of rice fields could affect the behavior of the birds related to foraging distribution patterns. Because environmental measures for the giant garter snake will prevent large blocks of land from being fallowed and will require maintenance of ditch habitat, any effect on foraging behavior is considered less than significant for the tricolored blackbird.

10.2.6.1.15 White-faced Ibis

White-faced Ibis Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing winter forage for this special status species. The white-faced ibis is primarily a winter migrant to the Central Valley. The largest breeding colonies are in Utah, Nevada, and Oregon. Key areas for wintering include the Delevan-Colusa Butte Sink, northwestern Yuba County, the Yolo Bypass, Grasslands Wetlands Complex, and Mendota Wildlife Area. There are reports of breeding colonies in the Central Valley, particularly within the Mendota Wildlife Area and Colusa National Wildlife Area. Within the Central Valley, the species occupies a variety of aquatic and wetland habitats, including rice fields that provide abundant prey (Remsen 1978). The ibis can breed from April to September (USFWS 1999).

Primary cause for the decline in numbers of this species is the drainage of wetlands and destruction of nesting habitat. SFA habitat is one of the many habitat types used by the species, and the species has no particularly affinity to rice fields compared to other wetland habitats.

The diet of the ibis consists of insects, small fish, and miscellaneous invertebrates (Granholm 1991). It feeds in flooded (less than 20 cm water depth) (USFWS 1999; RMI, 1997) or inactive fields that contain its prey items. Surveys of the Sacramento Valley found 66 percent of the ibis concentrated in agricultural fields. In one study up to 53 percent of the foraging ibis were observed in rice stubble (Shuford et. al. 1996).

The white-faced ibis is well adapted to changes in environmental conditions such as drought and flooding; therefore, use of specific areas can vary greatly from year to year depending on habitat conditions (Granholm 1991). The species interaction with the rice crop cycle includes using flooded land in the summer for foraging of prey, and dry or flooded rice fields in the winter, also for prey. Because the species is adaptive and responds to changes in environmental conditions, the effect of idling of flooded rice fields is considered to be less than significant. No environmental measure is proposed for the species.

10.2.6.1.16 Giant Garter Snake

Giant Garter Snake Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing replacement wetland habitat that this special status species uses year around thereby jeopardizing population numbers. Giant garter snakes' reliance on rice fields and agricultural drainage is due to a lack of viable alternative habitats. Most of its historic wetland habitat has been lost (USFWS 1999). Riparian woodlands do not provide the basking areas the snake requires to warm to activity levels (Hansen and Brode 1980), nor do they provide the pools of concentrated prey such as carp, mosquitofish, and bullfrogs (Rossman et al. 1996) the species relies upon for food. Open river environments make the giant garter snake susceptible to predation by non-native species such as bass and leveed rivers do not provide the snake with grassy banks for basking or elevated areas for hibernation (58 FR 54053, Oct 20, 1993).

Rice fields provide all necessary elements of the giant garter snake habitat. This includes irrigation canals and flooded fields that provide forage and escape, emergent vegetation for cover, and upland areas along canals for basking and dens. Populations of giant garter snakes in the Colusa, Butte, Sutter, and American River Basins are mostly associated with rice field habitats and their connecting irrigation and drainage canals (58 FR 54053, October 20, 1993). Current studies are finding up to 50 percent of observed individuals in rice field habitats (USFWS 1999).

The rice agriculture cycle, as described in Section 10.1.1.14, coincides closely with the habitat requirements of the giant garter snake. The snake hibernates over winter in dens near the fields and thus land management practices that do not involve reconstruction of drainage channels will not affect the snake. (The Rice Council has provided guidance to rice growers in relation to protecting the snake.) When the snake emerges from its burrow in March and April, water is only in the drainage ditches. This helps concentrate prey and facilitates the mating process. After field preparation, the fields are flooded increasing the forage habitat for the snake. When flooded, rice field habitat provides warm shallow open waters of prey for foraging (Hansen 1980, Brode and Hansen 1992, Hansen and Brode 1993). Once the rice plant emerges, the rice field provides cover from predators.

In July to early September, the female snakes give birth. Rice fields continue to provide food and cover for the snake population. Finally, in the fall when the fields are drained, the snake's prey species are concentrated in the drainage ditches. The snakes move into the adjacent drainages that, as long as the vegetation cover is retained, provide the necessary habitat and forage to prepare the snake for

hibernation. The concentration of prey in the canals is a benefit to the snakes inhabiting rice farmland. In the fall, the snakes return to burrows and cracks in the upland area to hibernate. Snakes are generally dormant from November to February (USFWS 1999).

In September, juveniles make extensive use of the pools of concentrated prey that are associated with the temporally coinciding rice field drainage areas. Prey concentrations in drainage pools provide pre-dormancy gorging opportunities for giant garter snakes.

Predation of giant garter snakes is limited to the habitat corridors such as irrigation and drainage ditches. Irrigation ditches provide both mobility and extensive cover for the snake (USFWS 1999). Removal of vegetation can expose snakes to predators, thereby considerably diminishing this particular habitat benefit. The loss of a food source and critical habitat as a result of EWA crop idling actions would have a significant adverse effect on the giant garter snake populations associated with SFA habitat. Environmental measures described in Section 10.2.4 would reduce this effect to a less-than-significant level.

10.2.6.1.17 Western Pond Turtle

Western Pond Turtle Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing habitat for this special status species. The western pond turtle is the only native box turtle widely distributed in the western United States.

Historically, the turtle once inhabited the vast permanent and seasonal wetlands of the Central Valley. The draining of wetlands for agriculture and urban development has greatly reduced this species' habitat. The western pond turtle is found in brackish permanent to intermittent aquatic habitats, including marshes, rivers, ponds, streams, and vernal pools. In the Central Valley it is also found in man-made habitats such as irrigation ditches, reservoirs, and ponds. Its preferred habitat is slow moving or quiet water, with emergent vegetation and undercuts for refuge. Protected, grassy uplands with a clay/silt soil are the preferred nesting sites. Because irrigation ditches typically are maintained, they generally do not include all required habitat elements for the turtle, particularly nesting habitat.

In addition to the loss of aquatic habitat, other causes of population decline include increased predation and collecting by man. Poor reproductive success due to predation and nest destruction is also hampering the turtle's recovery.

Females move upland from aquatic habitat to lay from 1 to 13 eggs. Eggs are laid May through July and juveniles hatch during August to October. Juveniles generally stay at the next site over winter. Movement of females from aquatic habitat to the nest and back, and juveniles from the nest, exposes the turtles to predation, particularly in agricultural areas where vegetation cover is controlled.

The diet of the western pond turtle is comprised primarily of small invertebrates, but adults do consume some vegetative matter. In seasonally flooded agricultural habitat, irrigation ditches and flooded rice land can contain required habitat elements for box

turtles. The turtles can forage in the aquatic habitat and bask on adjacent levees. The turtles are active during the spring, summer, and fall when rice preparation, growing, and harvesting is performed, respectively.

Because the western pond turtle can utilize irrigation ditches and rice fields as habitat, any action that dries up the habitat and forces the turtle to migrate to new areas, also exposes the turtle to increased predation. Further reduction of turtle population would be considered significant if it resulted from idling of seasonally flooded agricultural land. Environmental measures described in Section 10.2.4 for the giant garter snake will also be protective of the western pond turtle through the requirements to maintain irrigation ditch levels to six inches of normal and for retaining emergent vegetation with the ditches.

10.2.6.1.18 Wildlife in General

Wildlife Effects Statement: Crop idling would reduce the SFA acreage in the Sacramento Valley reducing habitat and forage for resident and migratory wildlife populations. In addition to the special status species presented above, the EIS/EIR considers other wildlife that are strongly dependent on rice croplands for some portion of their life cycle including waterfowl, wading birds, and shorebirds. This analysis approaches these species as guilds rather than analyzing each one individually. The Aleutian Canada goose was used to represent waterfowl; the great blue heron, great egret, and the snowy egret were used to represent wading birds; and the black tern was used to represent shorebirds. As stated above, the effects to these guilds would be less than significant with the implementation of the environmental measures presented in Section 10.2.4. Additionally, species such as the northern pintail and mallard also use rice fields for pair and brood habitat during the spring and summer. Up to 89,608 acres of rice fields may be lost during these critical times. Fallowing of approximately 20 percent of the current acreage of rice fields in the Sacramento Valley would have the following affects:

- Elimination of “pair” habitat of permanent residents who use winter flooded rice fields during the months in early spring. This will also eliminate “brood” water habitat that would normally be available during the spring and summer when rice is grown.
- Elimination of shallow flooded winter rice fields that wintering waterfowl use for night roosting and for food (vegetation and invertebrates). Flooded rice fields are frequented more than the natural wetlands by invertebrates as the winter progresses. Rice fields are also relied upon more heavily than natural wetlands as the winter progresses for dense cover at night since natural wetlands vegetation becomes prostrate and trampled, thus lacking needed protective cover.

However, there is still a large amount of forage and other habitat available to waterfowl within the Sacramento Valley. Although some waterfowl habitat may be affected, the overall effect is less than significant.

10.2.6.2 Delta

10.2.6.2.1 Introduction to Delta Effects Analysis

EWA acquisitions via groundwater substitution, crop idling, stored reservoir water purchase, stored groundwater purchase, and source shifting would change the timing of Delta flows.

Changing the flows in the Delta could potentially affect the growth, maintenance, and reproductive capacity of vegetation in the lower Sacramento River and Delta. Table 10-6 shows the long-term average changes in Delta outflows because of the Flexible Purchase Alternative.

The Flexible Purchase Alternative would result in changes in the Delta, but these changes would remain within the same general range of flows that the Delta experiences. The vegetation in the region has adapted to these flow ranges; therefore, these changes would likely not substantially affect the growth, maintenance, or reproductive capacity of this community.

Table 10-6
Long-term Average Delta Outflow Under Baseline Condition and Flexible Purchase Alternative (Maximum Water Purchase Scenario) Conditions

Month	Monthly Mean Flow ¹ (cfs)		Difference		
	Baseline	Flexible Purchase Alternative	(cfs)	(%) ²	TAF ²
Oct	7,494	7,494	0	0	0
Nov	14,729	14,729	0	0	0
Dec	29,135	29,762	627	2.2	37.3
Jan	35,403	36,000	597	1.7	35.5
Feb	57,924	58,824	900	1.6	53.5
Mar	53,136	54,665	1,529	2.9	90.9
Apr	29,039	30,674	1,635	5.6	97.3
May	17,995	19,372	1,377	7.7	81.9
Jun	13,767	14,792	1,025	7.4	60.9
Jul	7,915	8,354	439	5.6	26.1
Aug	4,192	4,492	300	7.2	17.9
Sep	5,574	5,884	310	5.6	18.5

¹ Based on 1979-1993 period of record.

² Relative difference of the monthly long-term average.

Changes to Delta inflows could result in changes in the position of X₂.⁸ Moving the X₂ location closer to the Delta would indicate that the EWA actions were decreasing Delta water quality, which could affect the Tidal Perennial Aquatic habitat. Table 10-7 shows the long-term average changes to the position of X₂. In all months, the X₂ location is closer to the Golden Gate Bridge, indicating better Delta salinity. These results are because of stipulations within the EWA program description that require the long-term average position of X₂ to be maintained through the use of carriage

⁸ The distance upstream from the Golden Gate Bridge (in km) at which mixing of freshwater from the Delta inflow and saltwater from the Bay results in a channel bottom salinity of two parts per thousand. Because Delta salinity is primarily a result of seawater intrusion, X₂ is mainly a measure of such intrusion; however, upstream sources such as agricultural drainage from the San Joaquin Valley also contribute to Delta salinity and to the values of X₂.

water releases. Chapter 5, Water Quality, contains additional analysis of Delta water quality, but concludes that EWA water acquisition and management effects would be less-than-significant.

10.2.6.2.2 Tidal Perennial Aquatic

The information presented in Section 10.2.6.2.1 indicates that EWA actions would not have an effect on this community from Baseline Conditions. This community is strongly influenced by global tides and EWA actions will maintain the position of X₂. In summary, changes to Delta inflows would not be of sufficient magnitude and frequency to significantly alter riparian habitat associated with this community. Therefore, the Flexible Purchase Alternative represents a less than significant effect on Delta tidal perennial aquatic habitat.

Table 10-7
Long-term Average Delta X₂ Position under Baseline and Flexible Purchase Alternative (Maximum Water Purchase Scenario) Conditions

Month	Monthly Mean Position ¹ (km)		
	Baseline	Flexible Purchase Alternative	Difference
Oct	85.3	84.5	-0.8
Nov	83.6	83.4	-0.2
Dec	80.3	80.2	-0.1
Jan	76.9	76.6	-0.3
Feb	71.7	71.3	-0.4
Mar	66.4	66.0	-0.4
Apr	64.5	63.8	-0.7
May	67.8	67.0	-0.8
Jun	72.0	70.9	-1.1
Jul	75.9	74.7	-1.2
Aug	79.5	78.6	-0.9
Sep	84.5	83.6	-0.9

¹ Kilometers from the Golden Gate Bridge.

10.2.6.2.3 Valley Riverine Aquatic

Valley riverine aquatic habitat in the Delta occurs in Delta waterways such as the Sacramento, San Joaquin, Consumnes, Mokelumne, and Calaveras rivers, and sloughs, streams, and ephemeral creeks. Major waterways in Suisun Bay and Marsh area that are considered VRA habitat include Suisun, Montezuma, and Nurse sloughs. Out of these rivers, the EWA actions would only affect the Sacramento and San Joaquin Rivers. The effects on Valley Riverine Aquatic habitat on these rivers within the Delta would be the same as those described in Section 10.2.6.1.1 for the Upstream in the Delta Region.

10.2.6.2.4 Saline Emergent

EWA acquisitions via groundwater substitution, crop idling, stored reservoir water purchase, stored groundwater purchase, and source shifting would change the timing of Delta inflows, outflows, and pumping operations. Similar to the effects on Tidal Perennial Aquatic habitat, changing flows in the Delta could affect the Saline Emergent community because flow and water quality changes could affect the growth, maintenance, and reproductive capacity of the vegetation within these communities. As discussed in

Section 10.2.6.2.1, the changes in Delta flow and water quality would not be of sufficient magnitude and frequency to cause these effects. Therefore, the Flexible Purchase Alternative would result in less-than-significant effects on saline emergent habitat.

10.2.6.2.5 Tidal Freshwater Emergent

EWA acquisitions via groundwater substitution, crop idling, stored reservoir water purchase, stored groundwater purchase, and source shifting would change the timing of Delta inflows, outflows, and pumping operations. The text in Section 10.2.6.2.2, Tidal Perennial Aquatic, includes an analysis of changes in Delta inflows, outflows, and pumping operations on the Delta communities. The analysis found that the flow changes within the Delta would not have the magnitude and frequency to affect the growth, maintenance, and reproductive capacity of Delta communities. Under Flexible Purchase Alternative, the long-term average position of X₂ would be maintained through the use of carriage water releases. Changes within the Delta would not significantly alter existing tidal freshwater emergent habitats and associated species dependent on the Delta. Therefore, the Flexible Purchase Alternative represents a less than significant effect on tidal freshwater emergent habitat.

10.2.6.2.6 Nontidal Freshwater Permanent Emergent

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no affect on nontidal freshwater permanent emergent habitat.

10.2.6.2.7 Natural Seasonal Wetland

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no affect on natural seasonal wetland habitat.

10.2.6.2.8 Managed Seasonal Wetland

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no affect on managed seasonal wetland habitat.

10.2.6.2.9 Valley/Foothill Riparian

The text in Section 10.2.6.2.2 Tidal Perennial Aquatic includes an analysis of potential direct and indirect effects on Delta NCCP communities, including valley/foothill riparian habitats and associated covered species. The effects presented in Section 10.2.6.2.2 would be the same for the portion of this community within the Delta. The same concerns for increased flow effects on riparian vegetation of upstream Sacramento River remain for the riparian vegetation of the Delta.

10.2.6.3 Export Service Areas

10.2.6.3.1 Lacustrine

Source shifting of Anderson Reservoir would decrease the summer water surface elevation of the reservoirs. EWA agencies could acquire up to 20,000 acre-feet of source shifting capability via agreements with Santa Clara Valley Water District (WD). Source shifting would delay the water amounts that the SWP delivers to the Santa Clara Valley WD, which would cause the Santa Clara Valley WD to draw upon other sources of water in the interim period. The Santa Clara Valley WD would typically

draw water from storage within Anderson Reservoir or temporarily reduce diversions to groundwater storage facilities. The water amounts drawn from each source would be at the discretion of Santa Clara Valley WD, but it would operate each facility within normal operating parameters. The levels of Anderson Reservoir currently vary widely year-to-year as part of normal Santa Clara Valley WD operations and EWA source shifting would occur within normal Santa Clara Valley WD operational parameters. Source shifting would not have adverse effects on lacustrine habitat at Anderson Reservoir.

EWA management of Santa Clara Valley WD water via predelivery could increase the surface water elevation in Anderson Reservoir in the months prior to the high point⁹ in San Luis Reservoir. With the EWA, water would be transferred from San Luis Reservoir to Anderson Reservoir or groundwater storage facilities prior to the high point in San Luis Reservoir. Although the amount of water within Anderson Reservoir would increase compared to the Baseline Condition, it would not exceed the existing drawdown zone (for flood control reasons) and inundate established shoreline habitats. Therefore, the effect on vegetation and wildlife would be less than significant.

Borrowing project water from San Luis Reservoir would decrease surface water elevations. Under Baseline Conditions, surface water elevations in San Luis Reservoir would begin to decrease in mid-April. At approximately 300,000 acre-feet, the “low-point problem” at San Luis Reservoir occurs, whereby warm-season algae growth and decreasing summer levels can affect the quality of the reservoir water. EWA actions would be managed to prevent contributing to or aggravating the low point problem. (See Figure 2-13, Section 2.4.2.3.2.) Therefore, the effect of borrowing project water on lacustrine habitat would be less than significant.

Source shifting by DWR at Metropolitan WD reservoirs would decrease the summer surface water elevation of the targeted reservoirs.

Metropolitan WD has many options for source shifting. These options include:

- **Lake Mathews, Lake Perris, Castaic Lake, and Diamond Valley Lake.** Metropolitan WD could delay delivery of SWP water and instead draw its supplies from these storage facilities; accepting the SWP water deliveries at a later date.
- **Semitropic and Arvin Edison.** During wet years, Metropolitan WD could reduce deliveries when they would have otherwise SWP delivered water to storage. Metropolitan WD could then deliver SWP water to Semitropic and Arvin Edison for storage at a later date.

⁹ High point is the value at which storage has peaked annually. In San Luis Reservoir, high point occurs approximately in mid-April.

- **Hayfield (upstream aqueduct groundwater storage on the Colorado River).** Metropolitan WD could delay delivery of Colorado River water to Hayfield; the water would be delivered at a later date.
- **Change blend.** Metropolitan WD generally maximizes water sources and quality by blending Colorado River and SWP water 50:50. Metropolitan WD could change the blend to provide water for source shifting.

Lake Mathews

Because the vegetation surrounding Lake Mathews is not dependent upon reservoir water levels changes to water surface elevations would be a less-than-significant effect on vegetation and wildlife.

Lake Perris and Castaic Lake

Metropolitan WD has rights to flexible storage in Castaic Lake and Lake Perris allowing the agency to borrow water from the lakes for up to 5 years, subject to DWR approval. The flexible storage in Castaic Lake is 153,940 acre-feet and 65,000 acre-feet in Lake Perris. Metropolitan WD gained these rights as part of the Monterey Amendments¹⁰, signed in 1995, and has exercised the right several times, including in 2001 as part of the source shifting agreement in that year. The amount of water that could be source shifted under the EWA would fall within the recent operating parameters of both Castaic Lake and Lake Perris.

Diamond Valley Lake

Because the vegetation surrounding Lake Mathews is not dependent upon reservoir water levels, changes to water surface elevations would be a less-than-significant effect on vegetation and wildlife.

Metropolitan WD management of EWA water provided as predelivery could increase the surface water elevation in Diamond Valley Lake, Lake Mathews, and other Metropolitan WD storage facilities. If Metropolitan WD were to accept predelivery water and use it to repay its flexible storage debt in Castaic Lake or Lake Perris, predelivery could affect the surface water elevations in those lakes as well. With the EWA, water could be transferred to Metropolitan WD at any of its turnouts and then to storage in Diamond Valley Lake, Lake Mathews, or other Metropolitan WD storage facilities, or used to repay flexible storage in Castaic Lake or Lake Perris. Although the amount of water within these facilities would increase compared to the Baseline Condition, water surface elevations would not exceed the existing drawdown zone (for flood control reasons) and inundate shoreline habitats. Therefore, the effect on vegetation and wildlife would be less than significant.

¹⁰ The Monterey Agreement, signed in 1994 by DWR and SWP water contractors, addresses water supply reliability problems, provides greater flexibility in water operations, and provides greater financial stability for SWP contractors.

10.2.6.3.2 Nontidal Freshwater Permanent Emergent

Borrowing Project water from San Luis Reservoir would decrease surface water elevations. As with all other reservoirs associated with EWA actions, reductions in water surface elevations would not affect shoreline communities such as nontidal freshwater permanent emergent vegetation because this vegetation is not dependent upon lake levels for water. Therefore, the effect of borrowing Project water would be less than significant.

10.2.6.3.3 Upland Cropland

EWA acquisition of water via idling cotton would take cotton land out of production. Cotton land provides extremely marginal habitat and forage to wildlife. Although a maximum of 182,800 acres of cotton would be idled, EWA actions would have less-than-significant effects on upland cropland habitat and associated wildlife.

10.2.7 Environmental Consequences/Environmental Impacts of the Fixed Purchase Alternative

The Fixed Purchase Alternative would involve the same water acquisition and management actions as the Flexible Purchase Alternative, but to a lesser degree. The Fixed Purchase Alternative limits upstream of the Delta transfers to 35,000 acre-feet and export service area transfers to 150,000 acre-feet. The Fixed Purchase Alternative can acquire its 35,000 acre-feet upstream from the Delta from one or multiple sources. The EWA agencies would be most likely to seek stored reservoir water for the entire purchase; however, the agencies might also rotate acquisitions among diverse sources. This section of the document assumes that the EWA agencies could acquire the 35,000 acre-feet from any mix of upstream-from-the-Delta sources. The Flexible Purchase Alternative allows transfers up to 600,000 acre-feet and does not specify transfer limits from upstream of the Delta or the export service areas. The effects described in Section 10.2.6 Flexible Purchase Alternative, represent the effects on vegetation and wildlife resources for a maximum transfer amount. Effects considered less than significant under the Flexible Purchase alternative would also be considered less than significant for a lesser transfer amount (The Fixed Purchase Alternative). Table 10-9 (towards the end of the chapter) shows the potential transfer amounts for each alternative and the significance of these transfers on vegetation and wildlife resources.

10.2.7.1 Upstream from the Delta

10.2.7.1.1 Valley Riverine Aquatic/Valley Foothill Riparian

This section analyzes the EWA effects on vegetation within each river system in the Upstream from the Delta Region. These effects would be similar to those discussed in Section 10.2.6.1.1.

Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would decrease Sacramento River flows from Lake Shasta downstream to the point of diversion in June. EWA acquisition of up to 35,000 acre-feet of water via groundwater substitution or up to 35,000 acre-feet from crop idling would decrease monthly

Sacramento River flows by 180 cfs in June. The effect due to this small flow decrease is less than significant.

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change Sacramento River flows downstream from Lake Shasta in July through September. EWA acquisition of up to 35,000 acre-feet of water via groundwater substitution and up to 35,000 acre-feet from crop idling would potentially increase Sacramento River flows between Lake Shasta and the point of diversion July through September. This change in flow is not considered significant to cause adverse effects.

Feather River

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would decrease flows in the South Fork of the Feather River from December through April and increase flows in the lower Feather River from July through September. Oroville-Wyandotte ID would deliver stored reservoir water for the EWA agencies from October through December, and DWR would store it in Lake Oroville until it could be transferred through the Delta during the following summer. During the rainy season after December, Oroville-Wyandotte ID would refill its reservoirs, which would decrease the flow that travels downstream of Sly Creek and Little Grass Valley Reservoirs. These decreases would occur during rain events during the winter, and would not likely have an effect on flow downstream of Lake Oroville. When the Oroville-Wyandotte ID water is released from Lake Oroville the following summer, this water would increase Feather River flows downstream of Oroville Reservoir from July to September. The section below describes the total increases in lower Feather River flow because of all EWA acquisitions from the Feather River system.

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase Feather River flows in July through September. A maximum of an additional 35,000 acre-feet would be released from Lake Oroville, which would increase flows in the Feather River below the Thermalito Afterbay by a maximum of 212 cfs. The effects of these EWA actions are evaluated in Section 10.2.6.1.1, Feather River for the Flexible Purchase Alternative. The increase in flow in the Feather River would be greater under the Flexible Purchase Alternative than under the Fixed Purchase Alternative. Because no adverse effect was determined under the Flexible Purchase Alternative, no effect would occur under the Fixed Purchase Alternative.

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would increase Feather River flows below Sly Creek and Little Grass Valley Reservoirs to Lake Oroville in November and December. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1, Feather River, for a discussion of potential effects.

Yuba River

EWA acquisition of Yuba County WA water via stored reservoir water and groundwater substitution would decrease Yuba River flows downstream of New Bullards Bar Reservoir from April to June and increase flows from July through September. Yuba County WA

would store water from groundwater substitution acquisitions in New Bullards Bar Reservoir until July, when the Delta pumps are available. Storing the water would decrease flows in the Yuba River from Englebright Dam, where the power facilities release Yuba County WA water, to the users' diversion points, typically at Englebright and Daguerre Point Dams. Yuba River flows would decrease by 195 cfs in late spring as farmers use groundwater for irrigation instead of surface water from New Bullards Bar Reservoir.

EWA acquisition of Yuba County WA stored reservoir water and Yuba River contractor water via groundwater substitution and stored reservoir water would increase Yuba River flows, downstream of Englebright Dam, from July to September relative to the Baseline Condition. Releases would be operated to maintain relatively constant flows during this time period in accordance with existing Yuba County WA operations to protect fish and the environment. Therefore, flows under EWA actions would not have a substantial adverse effect on Yuba River VRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

American River

EWA acquisition of Placer County WA stored reservoir water would increase American River flows downstream from French Meadows Reservoir to Folsom Lake from June to October. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1 American River, for a discussion of potential effects.

EWA acquisition of Placer County WA stored reservoir water would decrease American River flows downstream from French Meadows Reservoir to Folsom Lake during refill of Hell Hole and French Meadows Reservoirs. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1, American River, for a discussion of potential effects.

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase would increase American River flows downstream from Folsom Lake from June through December. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1, American River, for a discussion of potential effects.

Merced River

EWA acquisition of Merced ID water via groundwater substitution would decrease Merced River flows downstream from New Exchequer Dam to the point of diversion in April through June. Merced River flows would decrease by approximately 70 cfs. An equivalent amount of water could be sold to the EWA agencies under the Fixed Purchase Alternative, as is described under the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1 Merced River, for a discussion of potential effects.

San Joaquin River

EWA acquisition of MID water via groundwater substitution would increase San Joaquin River flows, below the San Joaquin-Merced river confluence, during the fall, relative to the Baseline Condition. Flows in the San Joaquin River would not change during the summer because it is downstream of Lake McSwain. Under the Fixed Purchase Alternative, long-term average flows during March through October on the San Joaquin River below its confluence with the Merced River would be essentially the same as the Baseline Condition.

10.2.7.1.2 Montane Riverine Aquatic/Montane Riparian Sacramento River

Montane Riverine Aquatic habitat occurs on the Sacramento River between approximately Red Bluff, CA and Lake Shasta. The analysis in Section 10.2.7.1 Valley Riverine Aquatic also applies to montane riverine aquatic. Therefore:

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling under the Fixed Purchase Alternative would change Sacramento River flows from June through September. From June to September, EWA acquisition of Sacramento River contractor water would slightly increase or decrease Sacramento River flows (depending on the Delta pump availability) relative to the ESA Baseline Condition.

Therefore, flows under EWA actions would not have a substantial adverse effect on Sacramento River MRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

Feather River

EWA acquisition of Oroville-Wyandotte ID stored reservoir water would increase flows in the South Fork of the Feather River from October through December and decreases flows during refill. Oroville-Wyandotte ID would deliver stored reservoir water for the EWA agencies from October through December, and DWR would store it in Lake Oroville until it could be transferred through the Delta during the following summer. During the rainy season after December, Oroville-Wyandotte ID would refill its reservoirs, which would decrease the flow that travels downstream of Sly Creek and Little Grass Valley Reservoirs.

Therefore, flows under EWA actions would not have a substantial adverse effect on Feather River MRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

Yuba River

Montane Riverine Aquatic habitat occurs on the Yuba River between approximately Timbuctoo Bend and New Bullards Bar Reservoir. The analysis in Section 10.2.7.1.1 Valley Riverine Aquatic also applies to montane riverine aquatic. Therefore:

EWA acquisition of Yuba County WA water via stored reservoir water and groundwater substitution would decrease Yuba River flows downstream of New Bullards Bar Reservoir from April to June and increase flows from July through September. Yuba County WA would store water from groundwater substitution acquisitions in New Bullards Bar Reservoir until July, when the Delta pumps are available. Storing the water would decrease flows in the Yuba River from Englebright Dam, where the power facilities release Yuba County WA water, to the users' diversion points, typically at Englebright and Daguerre Point Dams. Yuba River flows would decrease in late spring as farmers use groundwater for irrigation instead of surface water from New Bullards Bar Reservoir.

EWA acquisition of Yuba County WA stored reservoir water and Yuba River contractor water via groundwater substitution and stored reservoir water would increase Yuba River flows, downstream of Englebright Dam, from July to September relative to the Baseline Condition. Releases would be operated to maintain relatively constant flows during this time period in accordance with existing Yuba County WA operations to protect fish and the environment. Therefore, flows under EWA actions would not have a substantial adverse effect on Yuba River VRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

American River

EWA acquisition of Placer County WA stored reservoir water under the Fixed Purchase Alternative would increase flows in the Middle Fork of the American River from June to December. American River flows would increase from June through December because of releases from French Meadows and Hell Hole Reservoirs. These changes are not of sufficient magnitude or frequency to affect streambanks and existing aquatic or riparian species dependent on American River flows.

EWA acquisition of Placer County WA stored reservoir water would decrease flows in the Middle Fork of the American River compared to the Baseline Condition while the reservoir refills during winter months. During the rainy season after December, Placer County WA would refill its reservoirs, which would decrease the flow that travels downstream of French Meadows, and Hell Hole Reservoirs.

Therefore, flows under EWA actions would not have a substantial adverse effect on American River MRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

Merced River

Montane Riverine Aquatic habitat occurs on the Merced River between approximately Merced Falls and Lake McClure. The analysis in Section 10.2.7.1.1 Valley Riverine Aquatic also applies to montane riverine aquatic. Therefore:

EWA acquisition of Merced ID water via groundwater substitution would decrease Merced River summer flows and increase Merced River fall flows relative to the Baseline Condition. Merced ID would hold the EWA transfer water in Lake McClure until the fall, when it would release the water downstream. This pattern would decrease flows downstream of New Exchequer Dam in the summer, but only for the short distance between New Exchequer Dam and Lake McSwain (the typical diversion point). EWA acquisition of Merced ID water via groundwater substitution would increase Merced River flows in fall relative to the Baseline Condition as the water is released from Lake McClure.

Therefore, flows under EWA actions would not have a substantial adverse effect on Merced River MRA habitats used by special-status species or important for wildlife movement or wildlife nurseries. EWA actions would also not have a substantial adverse effect on sensitive natural communities.

10.2.7.1.3 Lacustrine

Comparing EWA actions to the Baseline Condition determines project effects. Reservoirs fluctuate seasonally in response to use and hydrology; therefore, this normal fluctuation creates the Baseline Condition. EWA actions further modify these fluctuations, sometimes accentuating changes and other times attenuating changes in reservoir levels.

Sacramento River

EWA acquisition of Sacramento River contractor water via groundwater substitution and crop idling would change the timing of releases from Lake Shasta. Lake Shasta would hold back at most 35,000 acre-feet that would have been released under the Baseline Condition. The lake level would decline slower in June. Then the lake level would decline faster in July and August compared to the Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September. The small changes during these months would not be enough to affect the lacustrine habitat within the lake or surrounding the lake perimeter. The water source for riparian vegetation will not be affected and the upland scrub vegetation surrounding the reservoir does not rely on the reservoir for its water source. Therefore, the change in Lake Shasta water surface elevation would have a less-than-significant effect on the lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries along the water edge.

Feather River

EWA acquisition of Oroville-Wyandotte Irrigation District (Oroville-Wyandotte ID) stored reservoir water would decrease surface water elevations December until refill for Sly Creek and Little Grass Valley Reservoirs. Little Grass Valley and Sly Creek Reservoirs are upstream from Lake Oroville on the Feather River. These reservoirs would release a combined maximum of 15,000 acre-feet of water from November to December. The same amount of water could be transferred under the Fixed Purchase Alternative as described in the Flexible Purchase Alternative. Refer to Section 10.2.6.1.3, Feather River, for a discussion of potential effects. The effects of the Flexible Purchase

Alternative are considered less than significant; the effects of the Fixed Purchase Alternative are also considered less than significant.

EWA acquisition of water from Western Canal WD, Joint Water Districts, and Garden Highway MWC via crop idling and groundwater substitution would increase the surface water elevation April to June and decrease the surface water elevation in July and August in Lake Oroville compared to the Baseline Condition. EWA could acquire up to 35,000 acre-feet of water via groundwater substitution or up to 35,000 acre-feet from crop idling. Effects on Lake Oroville from an increase (April through June) and decrease (July and August) in surface water elevation are evaluated in Section 10.2.6.1.1, Feather River for the Flexible Purchase Alternative. There would be less change in surface water elevation under the Fixed Purchase Alternative than under the Flexible Purchase Alternative. Because there were no significant effects under the Flexible Purchase Alternative, there are no significant effects under the Fixed Purchase Alternative.

Yuba River

EWA acquisition of water from Yuba County Water Agency (Yuba County WA) via stored reservoir water and groundwater substitution would alter the surface water elevation April to refill at New Bullards Bar Reservoir. EWA agencies would acquire 35,000 acre-feet through groundwater substitution. During April through June, New Bullards Bar Reservoir would hold back water that would have been released under the Baseline Condition. By the end of June, the surface water elevation in the reservoir would be, at most, 2 feet higher than under the Baseline Condition. An increase in the surface water elevation would only inundate the existing drawdown zone and would not affect vegetation and wildlife.

EWA acquisition of Yuba County Water Agency (Yuba County WA) stored reservoir water would decrease surface water elevations July to refill at New Bullards Bar Reservoir. New Bullards Bar Reservoir would release, at a maximum, 35,000 acre-feet of water to be used as an EWA asset. Yuba County WA would not enter into a transfer agreement unless local needs, instream flows, and system demand requirements were met. If these elements were met, EWA agencies could acquire up to 35,000 acre-feet, decreasing the reservoir elevation 8 feet by September. Again, the drawdown zone is vegetated primarily with non-native herbaceous plants and scattered willow shrubs that do not form a contiguous riparian community and would not be affected by decreases in water levels caused by EWA actions (CALFED 1998). Therefore, the EWA acquisition of Yuba County WA water and its effects on lacustrine habitat are considered less than significant.

American River

EWA acquisition of Placer County WA stored reservoir water would decrease surface water elevations June to refill at Hell Hole and/or French Meadows Reservoirs. Hell Hole Reservoir and French Meadows Reservoir would release a combined maximum of 20,000 acre-feet of water. An equivalent amount of water could be sold to the EWA agencies under the Fixed Purchase Alternative, as is described under the Flexible Purchase Alternative. Refer to Section 10.2.6.1.1, American River, for a discussion of

potential effects. The effects of the Flexible Purchase Alternative are considered less than significant; the effects of the Fixed Purchase Alternative are also considered less than significant.

EWA acquisition of Sacramento Groundwater Authority's water via stored groundwater purchase and Placer County WA's water via stored reservoir water would change surface water elevations in Folsom Lake. During July and August, the surface water elevation at Folsom Lake would be lower than the Baseline Condition. The lake level would decline faster in July and August compared to the Baseline Condition; however, end of month elevation in September would be the same as the Baseline Condition because of reduced releases during September. Therefore, the change in Folsom Lake surface water elevations would have less-than-significant effects on lacustrine habitat used by special-status species or other wildlife, particularly as wildlife movement corridors or nurseries.

Merced River

EWA acquisition of Merced ID water via groundwater substitution would increase the water surface elevation in Lake McClure compared to the Baseline Condition. EWA agencies could acquire 25,000 acre-feet through groundwater substitution. As shown in Figure 14-13, water levels in Lake McClure would only increase. An increase in surface water elevation would have a beneficial effect on the amount of lacustrine habitat.

10.2.7.1.4 Nontidal Freshwater Permanent Emergent

In the Upstream from the Delta Region, the lowering of water tables as part of groundwater substitution actions could affect this habitat by potentially disrupting groundwater to surface water interactions that may support freshwater permanent emergent habitat. However, a well adequacy review to preclude pumping in areas with groundwater to surface water interactions will occur prior to all groundwater actions to prevent effect on nontidal freshwater permanent emergent habitat. Effects on nontidal freshwater permanent emergent habitat and associated special-status and other wildlife are less than significant.

10.2.7.1.5 Natural Seasonal Wetland

Groundwater pumping, as a part of groundwater substitution or groundwater purchase actions, in areas where there is direct connection between groundwater and surface water, could affect groundwater hydrology (lower the groundwater table) thereby drying up some natural seasonal wetlands. As an environmental measure, the EWA agencies will review all groundwater substitution and purchase proposals to ensure that there is no groundwater to surface water interaction that may be affected by groundwater pumping. The groundwater mitigation measures also include a mitigation response (e.g., cease pumping or provide alternative surface water source) should an undiscovered groundwater to surface water interaction become evident. (See Section 6.2.7.) Effects on natural seasonal wetland habitat and associated special-status and other wildlife are less than significant.

10.2.7.1.6 *Managed Seasonal Wetland*

Groundwater substitution and crop idling actions could have adverse effects (dry up) on managed seasonal wetlands. The project effects on natural seasonal wetlands and associated environmental measures outlined in the previous section are also applicable for managed seasonal wetland habitats.

In addition, both groundwater substitution and crop idling actions could result in less water in agriculture supply and return flow ditches, potentially resulting in the desiccation of managed seasonal wetlands. Project effects on agricultural water supplies caused by these two EWA actions are detailed in the sections below.

Groundwater Substitution Transfers in the Sacramento Valley

Groundwater substitution transfers would decrease flows in agricultural delivery ditches. When water agencies agree to sell water to the EWA agencies through groundwater substitution transfers, the water agencies help to identify willing sellers within each area. The sellers then forgo their surface water supplies and substitute water supplies with groundwater. This change results in less diversion into the agricultural delivery system, which could affect species within the delivery ditches. This decrease is likely to adversely affect the species and vegetation that depend on this flow. Measures incorporated into the project would reduce effects to a less-than-significant level. (See Section 10.2.4.)

Crop Idling Transfers

The effects of crop idling transfers on managed seasonal wetlands depend on the location of the transfers. The following section is divided by river system to fully explain these potential effects.

Sacramento River

EWA acquisition of water via crop idling would reduce the water supply for managed seasonal wetlands that rely on return flows from fields that would be idled. Glenn, Colusa, and Yolo Counties could idle up to 10,600 acres. EWA agencies would purchase approximately 3.3 acre-feet per acre (the amount of water consumed by the crop); however, under the Baseline Condition, water agencies divert additional water from the Sacramento River to account for system losses. System losses include conveyance losses (evaporation or percolation within the conveyance system), riparian evapotranspiration (water used by vegetation along the conveyance system), and on-farm losses (deep percolation to groundwater or tailwater runoff). The amount of water diverted varies depending on the amount of system losses.

If farmers idled their crops, their water agency would reduce diversions by the 3.3 acre-feet per acre plus the additional amount that goes to on-farm losses. Of this additional amount that is applied to fields in the Baseline Condition, a portion percolates into the groundwater aquifer below and a portion runs off the field back into the conveyance system. This "tailwater" that runs back into the conveyance system could then be used again by managed wetlands downstream on the conveyance system. If farmers idled land, tailwater would no longer be available to downstream users, either other farmers or managed wetlands.

Few managed seasonal wetlands exist downstream of the water agencies that may sell water to the EWA agencies via crop idling. These wetlands, however, have the potential to be adversely affected by the reduction in return flows. The measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

Feather River

EWA acquisition of water via crop idling would reduce the water supply for managed seasonal wetlands that rely on the return flows from fields that would be idled. Butte and Sutter Counties could idle up to 10,600 acres. As described above for the Sacramento River, idling these fields would reduce tailwater, which could reduce supplies to downstream wetlands. Several of the agencies within Butte and Sutter Counties discharge return flows from the irrigation systems into Butte Creek, which provides water for several managed seasonal wetlands. The reduction in return flows has the potential to adversely affect these managed seasonal wetlands. The environmental measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

American River

EWA acquisition of water via crop idling would reduce the water supply for managed seasonal wetlands that rely on return flows from fields that would be idled. Placer County could idle up to 3,280 acres. As described above for the Sacramento River, idling these fields would reduce tailwater, which could reduce supplies to downstream wetlands. The reduction in return flows has the potential to adversely affect managed seasonal wetlands. The environmental measures in Section 10.2.4 would reduce effects to managed seasonal wetlands to a less-than-significant level.

10.2.7.1.7 Seasonally Flooded Agriculture

Crop idling would reduce the rice acreage in the Sacramento Valley. Table 10-8 displays SFA acreage and waste grain reduction for the maximum acreage of crop idling anticipated for all counties where idling action could occur for the EWA program Fixed Purchase Alternative. These numbers reflect the maximum water transfers (for all water programs acquiring water through crop idling) based on the project limitation of 15,000 acres in Glenn, Colusa, or Yolo Counties and 10,600 acres in Butte, Sutter, and Placer Counties, or a 20 percent maximum crop acreage idled per county. Idling this acreage would reduce the extent of habitat available to those special-status species dependent upon SFA for some portion of their lifecycle (identified with an * in Table 10-3), which is likely to adversely affect those species. Details regarding effects to these species are presented in Section 10.2.6.1.7 for the Flexible Purchase Alternative. Because the Fixed Purchase alternative would involve less acreage, the effects would be similar or less than those of the Flexible Purchase Alternative. Section 10.2.4 proposes environmental measures to help minimize any adverse effects to special-status species.

Table 10-8 also displays the reduction in the availability of waste grain as forage to wildlife by county and total for all crop idling actions (depending on agricultural practices). This amount represents a potentially adverse effect to those special-status

species dependent upon waste grain for a large portion of their forage (identified with an * in Table 10-3). Environmental measures proposed in Section 10.2.4 help to minimize any adverse effects to special-status species.

Table 10-8
Seasonally Flooded Agriculture Acreage and Waste Grain Reductions in Each County
Based on Crop Idling Maximum Purchases under the Fixed Purchase Alternative

	Rice Acreage (97 Ag Census) (AC)	Idled Acreage (AC)	Percent Rice Acreage (%)	Waste Grain per Acre (lbs)	Total Waste Grain (million lbs)	Waste Grain Loss (million lbs)	Percent Waste Grain Loss (%)	Total Acre-Feet of Water Available for EWA Fish Actions (TAF)	Potential Square Miles Idled
Butte	95,120	10,600	11	350	33.3	3.7	11	35.0	17
Colusa	132,338	15,000	11	350	46.3	5.2	11	49.5	23
Glenn	83,777	15,000	18	350	29.3	5.2	18	49.5	23
Placer	16,379	3,280	20	350	5.7	1.1	20	10.8	5
Sutter	96,722	10,600	11	350	33.9	3.7	11	35.0	17
Yolo	23,822	4,770	20	350	8.3	1.7	20	15.7	7
Total	448,158	59,250	13	350	156.9	20.7	13	195.5	93

Associated with the idling of SFA is the potential loss of water within adjacent irrigation and return ditches in all 6 counties. EWA agency acquired water would not enter water agencies' distribution systems because it is no longer being delivered to the agricultural users, and unused flows from the fields would not return to the delivery system. These changes have the potential to reduce flow in these ditches, thereby reducing the value of habitat provided. Some irrigation ditches provide forage, resting, and nesting habitat and serve as migration corridors. Devaluing or losing this habitat could affect giant garter snakes, herons, egrets, western pond turtles, etc. This decrease to water in agricultural ditches is potentially an adverse effect to these special-status species. Environmental measures proposed in Section 10.2.4 help to minimize any adverse effects to special-status species.

Associated with the idling of SFA is the potential for fragmentation of seasonally flooded agriculture land habitat. Assuming the maximum acreage is followed, a total of 93 square miles of formerly flooded land would be dry in all 6 counties over the late spring, summer, and early fall months. This impact would be significant if it occurred as one contiguous block of SFA. The idled land would have the potential to interfere with wildlife migration and the dispersal of individuals within a metapopulation (hence a loss of genetic diversity). The inability of a snake to migrate to more suitable habitat would potentially be an adverse effect to this special-status species, especially those populations that are succumbing to other population pressures. Environmental measures proposed in Section 10.2.4 help to minimize any adverse effects to special-status species.

Wildlife strongly dependent on rice croplands for some portion of their life cycle includes waterfowl, wading birds, and shorebirds. This analysis approaches these species as guilds rather than analyzing each one individually. The Aleutian Canada goose was used to represent waterfowl; the great blue heron was used to represent wading birds; and the black tern was used to represent shorebirds. As stated above, the effects to these guilds would be less than significant with the implementation of the environmental measures in Section 10.2.4.

10.2.7.2 Delta

10.2.7.2.1 Tidal Perennial Aquatic

EWA acquisitions via groundwater substitution, crop idling, stored reservoir water purchase, stored groundwater purchase, and source shifting change the timing of Delta pumping operations, and have the potential to result in changes to Delta inflows and associated parameters. Potential changes in lower Sacramento River flows can result in changes in the position of X_2 . Under EWA actions, long-term average flows in the lower Sacramento River at Freeport would be similar relative to the Baseline Condition. Under EWA actions, the long-term average position of X_2 would be maintained through the use of carriage water releases and other EWA asset directed releases controlling X_2 , relative to the Baseline Condition.

In summary, changes to Delta inflows would not be of sufficient magnitude and frequency to significantly alter existing riparian and wetland habitat found in the Delta. Therefore, the Fixed Purchase Alternative represents a less than significant effect on Delta tidal perennial aquatic habitat.

10.2.7.2.2 Valley Riverine Aquatic

Valley riverine aquatic habitat in the Delta occurs in Delta waterways such as the Sacramento, San Joaquin, Consumnes, Mokelumne, and Calaveras rivers, and sloughs, streams, and ephemeral creeks. Major waterways in Suisun Bay and Marsh area that are considered VRA habitat include Suisun, Montezuma, and Nurse sloughs.

EWA acquisition of water via groundwater substitution, groundwater purchase, crop idling, and stored reservoir water purchase would change Sacramento River flows from June through September. From June to September, EWA acquisition of Sacramento River contractor water would slightly increase or decrease Sacramento River flows (depending on the Delta pump availability) relative to the Baseline Condition. However, the Fixed Purchase Alternative would not shift flows outside the long-term average on the Sacramento River.

10.2.7.2.3 Saline Emergent

The text in Section 10.2.7.2.1 Tidal Perennial Aquatic includes an analysis of potential direct and indirect effects on Delta NCCP communities, including saline emergent habitats and associated covered species.

In summary, under the Fixed Purchase Alternative, long-term average flows in the lower Sacramento River at Freeport would be similar relative to the Baseline Condition. Under the Fixed Purchase Alternative, the long-term average position of

X₂ would be maintained through the use of carriage water releases and other EWA asset directed releases controlling X₂, relative to the Baseline Condition. Changes to Delta inflows would not be of sufficient magnitude and frequency to significantly alter existing saline emergent habitats and associated species dependent on the Delta. Therefore, the Fixed Purchase Alternative represents a less than significant effect on saline emergent habitat.

10.2.7.2.4 Tidal Freshwater Emergent

The text in Section 10.2.7.2.1 Tidal Perennial Aquatic includes an analysis of potential direct and indirect effects on Delta NCCP communities, including tidal freshwater emergent habitats and associated covered species.

In summary, under the Fixed Purchase Alternative, long-term average flows in the lower Sacramento River at Freeport would be similar relative to the Baseline Condition. Under the Fixed Purchase Alternative, the long-term average position of X₂ would be maintained through the use of carriage water releases and other EWA asset directed releases controlling X₂, relative to the Baseline Condition. Changes to Delta inflows would not be of sufficient magnitude and frequency to significantly alter existing tidal freshwater emergent habitats and associated species dependent on the Delta. Therefore, the Fixed Purchase Alternative represents a less than significant effect on tidal freshwater emergent habitat.

10.2.7.2.5 Nontidal Freshwater Permanent Emergent

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no effect on nontidal freshwater permanent emergent habitat.

10.2.7.2.6 Natural Seasonal Wetland

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no effect on natural seasonal wetland habitat.

10.2.7.2.7 Managed Seasonal Wetland

EWA actions would only affect flows in Delta waterways. Changes in Delta flows will have no effect on managed seasonal wetland habitat.

10.2.7.2.8 Valley/Foothill Riparian

The text in Section 10.2.7.2.1 Tidal Perennial Aquatic includes an analysis of potential direct and indirect effects on Delta NCCP communities, including valley/foothill riparian habitats and associated covered species.

In summary, under the Fixed Purchase Alternative, long-term average flows in the lower Sacramento River at Freeport would be similar relative to the Baseline Condition. Changes to Delta inflows would not be of sufficient magnitude and frequency to significantly alter existing valley/foothill riparian habitats and associated species dependent on the Delta. Therefore, the Fixed Purchase Alternative represents a less than significant effect on valley/foothill riparian habitat.

10.2.7.3 Export Service Areas

10.2.7.3.1 Lacustrine

Source shifting of Anderson Reservoir would decrease the summer water surface elevation of the reservoirs. EWA agencies could acquire up to 20,000 acre-feet of source shifting capability via agreements with Santa Clara Valley Water District (WD). Source shifting would delay the water amounts that the SWP delivers to the Santa Clara Valley WD, which would cause the Santa Clara Valley WD to draw upon other sources of water in the interim period. The Santa Clara Valley WD would typically draw water storage within Anderson Reservoir or temporarily reduce diversions to groundwater storage facilities. The water amounts drawn from each source would be at the discretion of Santa Clara Valley WD, but it would operate each facility within normal operating parameters. The levels of Anderson Reservoir currently vary widely year-to-year as part of normal Santa Clara Valley WD operations and EWA source shifting would occur within normal Santa Clara Valley WD operational parameters. Source shifting would not have adverse effects on lacustrine habitat at Anderson Reservoir.

EWA management of Santa Clara Valley WD water via predelivery could increase the surface water elevation in Anderson Reservoir in the months prior to the high point¹¹ in San Luis Reservoir. The effects of predelivery under the Fixed Purchase Alternative are equivalent to the effects as described under the Flexible Purchase Alternative because the transfer amounts are the same under both Alternatives. Therefore, the effect of predelivery on vegetation and wildlife would be less than significant.

Borrowing project water from San Luis Reservoir would decrease surface water elevations. Under Baseline Conditions, surface water elevations in San Luis Reservoir would begin to decrease in mid-April. At approximately 300,000 acre-feet, the low-point problem at San Luis Reservoir occurs, whereby warm-season algae growth and decreasing summer levels can affect the quality of the reservoir water and impair the ability of urban water agencies to treat the water adequately for municipal and industrial uses. EWA actions would be managed to prevent contributing to or aggravating the low point problem. (See Figure 2-13, Section 2.4.2.3.2.) Under the Baseline Condition, San Luis Reservoir is drawn down each summer; however, vegetation surrounding the reservoir and within the drawdown zone would not be affected. Therefore, the effect of borrowing project water would be less than significant.

Source shifting by Metropolitan WD would decrease the summer surface water elevation of reservoirs used by Metropolitan WD. Source shifting options by Metropolitan WD would be the same under the Fixed Purchase Alternative as those described under the Flexible Purchase Alternative. Metropolitan WD could source shift a maximum of 200,000 acre-feet. Metropolitan WD has rights to flexible storage of over 153,940 acre-feet and 65,000 acre-feet of flexible storage in Castaic Lake and Lake Perris, respectively. The action of source shifting would fall under current operating

¹¹ High point is the value at which storage has peaked annually. In San Luis Reservoir, high point occurs approximately in mid-April.

parameters; therefore, there would be no change from the Baseline Condition and a less-than-significant effect on lacustrine habitats.

Metropolitan WD management of EWA water provided as predelivery could increase the surface water elevation in Diamond Valley Lake, Lake Mathews, and other Metropolitan WD storage facilities. If Metropolitan WD were to accept predelivery water and use it to repay its flexible storage debt in Castaic Lake or Lake Perris, predelivery could affect the surface water elevations in those lakes as well. The effects of predelivery under the Fixed Purchase Alternative are equivalent to the effects as described under the Flexible Purchase Alternative because the transfer amounts are the same under both Alternatives. Therefore, the effect of predelivery on vegetation and wildlife would be less than significant.

10.2.7.3.2 Nontidal Freshwater Permanent Emergent

As with all other reservoirs associated with EWA actions, reductions in water surface elevations would not affect shoreline such as nontidal freshwater permanent emergent vegetation because this vegetation is not dependent upon lake levels for water. Therefore, the effect of borrowing project water would be less than significant.

10.2.7.3.3 Upland Cropland

Cotton land provides extremely marginal habitat and forage to wildlife. Although a maximum of 177,300 acres of cotton would be idled, EWA actions would have no adverse effects on upland cropland habitat and associated wildlife.

10.2.8 Comparative Analysis of Alternatives

10.2.8.1 Upstream from the Delta

In the Upstream from the Delta region, the Fixed Purchase Alternative would be limited to a maximum acquisition of 35,000 acre-feet from all sources of water. This amount could typically be obtained from stored reservoir water purchases in most year types. In very dry years, stored reservoir water may not be available, and the EWA agencies would need to look to other sources.

The Flexible Purchase Alternative could involve the purchase of up to 600,000 acre-feet of water from all sources upstream from the Delta. EWA agencies would prefer to purchase water from upstream sources because the water is generally less expensive. The amount that could be purchased would be limited by the capacity of the Delta export pumps to move the water to export areas south of the Delta. During wet years, excess pump capacity may be limited to between 50,000 and 60,000 acre-feet of EWA asset water because the pumps primarily would be used to export state and federal project water to export service area users. During dry years, when there would be less Project water available for pumping (and therefore the pumps would have greater availability capacity), the EWA Project Agencies could acquire up to 600,000 acre-feet of water from sources upstream from the Delta. Table 10-9 compares the Flexible and Fixed Purchase Alternatives to the Baseline Condition.

The EWA Project Agencies usually prefer to purchase stored reservoir water because it is the least expensive option. In dry years for the Fixed Purchase Alternative, they would likely purchase all stored reservoir water available, and then look to other options for the remainder of their purchases. The effects on vegetation and wildlife would be greater during these years. In wet years, a portion of the stored reservoir water available would likely provide the entire amount of water that could be moved through the Delta. During these years the effects on vegetation and wildlife would be minimal.

The potential for effects on vegetation and wildlife during wet years for the Flexible Purchase Alternative would be very similar to the Fixed Purchase Alternative. That is, during wet years, acquisitions would most likely be from stored water sources and groundwater and crop idling sources would not be used. However, as rainfall amounts for areas north of the Delta decrease, reflecting dry year conditions, the greater capacity of the export pumps to move EWA assets could result in a greater reliance on crop idling and groundwater resources for the additional EWA acquisitions. If the EWA Project Agencies were to acquire 600,000 acre-feet upstream from the Delta, they would need to utilize most available sources, which would include stored reservoir water, groundwater substitution, groundwater purchase, and crop idling. Although the groundwater mitigation measures and socioeconomic thresholds would be employed to minimize the potential for impact, the greater reliance on crop idling and groundwater acquisitions during dry years would result in the Flexible Purchase Alternative having a greater potential for effects on vegetation and wildlife than the Fixed Purchase Alternative.

10.2.8.2 Export Service Area

EWA asset acquisitions in the Export Service Area under the Fixed Purchase Alternative would be limited to 150,000 acre-feet from stored groundwater and crop idling sources. Stored groundwater would be acquired from agencies that have previously stored water in the ground (e.g., Kern Water Bank). Therefore, there would not be an adverse effect on vegetation and wildlife in the Export Service Area under the Fixed Purchase Alternative. Crop idling would only occur on cotton fields. Cotton provides poor quality habitat for wildlife; therefore, any amount of idling of these fields would not affect vegetation wildlife.

EWA asset acquisitions in the Export Service Area under the Flexible Purchase Alternative would be dependent on the water year type north of the Delta. Export pump capacity during wet years would limit the ability of the EWA Project Agencies to move assets through the Delta, requiring reliance on greater purchase amounts from export area sources. During wet years, acquisitions within the export service area could involve up to 540,000 acre-feet of assets. The EWA agencies would acquire assets from stored groundwater and idled cropland sources. Because groundwater would be purchased from previously stored banks of water, no adverse effects to groundwater resources within the export service area would be expected under the Flexible Purchase Alternative. Again, crop idling would occur on cotton fields. There would be no impacts to vegetation and wildlife.

Table 10-9

Vegetation and Wildlife: Potential Transfer Amounts and Comparison of the Flexible and Fixed Purchase Alternatives

Decreases are release to point of diversion. Below point of diversion there are no decreases.
Increases are below point of diversion. Increases are less above point of diversion.

Region	Asset Acquisition or Management	Result	Effects on Vegetation and Wildlife	Flexible Alternative Change from Baseline	Fixed Alternative Change from Baseline	Significance of Flexible Alternative	Significance of Fixed Alternative	Comments
Upstream from the Delta Region								
Sacramento River	Groundwater substitution/Crop idling Flexible: 225,000 acre-feet Fixed: 35,000 acre-feet	Water held in Lake Shasta in June	Sacramento River flows decrease in June	Sacramento River flows decrease by a maximum of 1,160 cfs	Sacramento River flows decrease by a maximum of 180 cfs	Less-than-significant	Less-than-significant	
			Slower decrease in water levels in Lake Shasta in June, relative to the Baseline Condition	Lake Shasta contains as much as 68,900 acre-feet more compared to the Baseline Conditions	Lake Shasta contains as much as 9,000 acre-feet more compared to Baseline Conditions	Less-than-significant	Less-than-significant	
		Water is released from Lake Shasta is not diverted	Sacramento River flows increase July – September	Sacramento River increases by a maximum of 1,940 cfs	Sacramento River increases	Less-than-significant with environmental measures	Less-than-significant with environmental measures	
	Crop Idling Flexible 35,000 acre-feet Fixed: 35,000 acre-feet	Conversion of rice crop to bare fields	Reduced rice crop acreage in Glenn, Colusa, and Yolo Counties	Idle a maximum of 47,980 acres, which is a loss of habitat and forage	Idle a maximum of 34,770 acres, which is a loss of habitat and forage	Less-than-significant with environmental measures	Less-than-significant with environmental measures	
Feather River Region	Stored Reservoir Water Flexible & Fixed: Sly Creek – 5,000 acre-feet Little Grass Valley – 12,000 acre-feet	Water released from Sly Creek and Little Grass Valley Reservoirs	Sly Creek and Little Grass Valley Reservoir levels lower than the Baseline Condition November – refill	Sly Creek reduced by maximum of 5,000 acre-feet and 17 feet (ft) in elevation. Little Grass Valley reduced by maximum of 12,000 acre-feet and 12 ft in elevation.	Sly Creek reduced by maximum of 5,000 acre-feet and 17 ft in elevation. Little Grass Valley reduced by maximum of 12,000 acre-feet and 12 ft in elevation.	Less-than-significant	Less-than-significant	
			Increased flows diverted through Woodleaf and Forbestown tunnels in November and December	No effect on vegetation and wildlife.	No effect on vegetation and wildlife.	Less-than-significant	Less-than-significant	

Table 10-9

Vegetation and Wildlife: Potential Transfer Amounts and Comparison of the Flexible and Fixed Purchase Alternatives

Decreases are release to point of diversion. Below point of diversion there are no decreases.
Increases are below point of diversion. Increases are less above point of diversion.

Region	Asset Acquisition or Management	Result	Effects on Vegetation and Wildlife	Flexible Alternative Change from Baseline	Fixed Alternative Change from Baseline	Significance of Flexible Alternative	Significance of Fixed Alternative	Comments
			Oroville levels increased November through following September	Lake Oroville increases by a maximum of 15,000 acre-feet	Lake Oroville increases by a maximum of 15,000 acre-feet	Less-than-significant	Less-than-significant	
		Water is held in Little Grass Valley and Sly Creek Reservoirs during refill	Flows in the Feather River are decreased during refill	Feather River flows are decreased during refill	Feather River flows are decreased during refill	Less-than-significant	Less-than-significant	
		Water released from Lake Oroville	Increased flows in Feather River downstream of Lake Oroville July - September	Feather River flow increases by a maximum of 84 cfs	Feather River flow increases by a maximum of 84 cfs	Less-than-significant	Less-than-significant	
	Groundwater Substitution/ Crop Idling Flexible: 236,500 acre-feet Fixed: 35,000 acre-feet	Water is held in Lake Oroville April – June	Slower decrease in water levels in Lake Oroville from April – June compared to Baseline Conditions	Lake Oroville would be at most, 2 feet higher than the Baseline Condition.	Lake Oroville contains as much as 17,900 acre-feet more than Baseline Conditions	Less-than-significant	Less-than-significant	
		Water is released from Lake Oroville	Feather River flows downstream of Oroville increase July – September	Feather River flow increases by a maximum of 2,105 cfs.	Feather River flow increases by a maximum of 212 cfs.	Less-than-significant with environmental measures	Less-than-significant with environmental measures	
	Crop Idling Flexible: 120,000 acre-feet Fixed: 35,000 acre-feet	Conversion of rice crops to bare fields	Reduced rice crop acreage in Butte and Sutter counties	Idle a maximum of 38,340 acres	Idle a maximum of 21,200 acres	Less-than-significant with environmental measures	Less-than-significant with environmental measures	
	Yuba River Region	Stored Reservoir Water Flexible: 100,000 acre-feet Fixed: 35,000 acre-feet	Timing of water released from New Bullards Bar Reservoir is changed	Yuba River flows increase July – September	Yuba River flow increases by a maximum of 1005 cfs	Yuba River flow increases	Less-than-significant with environmental measures	Less-than-significant with environmental measures
Yuba River flows decrease during refill				Yuba River flows decrease during refill	Yuba River flows decrease during refill	Less-than-significant	Less-than-significant	

Table 10-9

Vegetation and Wildlife: Potential Transfer Amounts and Comparison of the Flexible and Fixed Purchase Alternatives

Decreases are release to point of diversion. Below point of diversion there are no decreases.
Increases are below point of diversion. Increases are less above point of diversion.

Region	Asset Acquisition or Management	Result	Effects on Vegetation and Wildlife	Flexible Alternative Change from Baseline	Fixed Alternative Change from Baseline	Significance of Flexible Alternative	Significance of Fixed Alternative	Comments
			Slower decrease in water levels in New Bullards Bar Reservoir from April – September relative to Baseline Conditions	New Bullards Bar Reservoir is 5 ft higher in elevation than Baseline Conditions	New Bullards Bar Reservoir is 2 ft higher in elevation than Baseline Conditions	Less-than-significant	Less-than-significant	
			New Bullards Bar water levels are lower than the Baseline Condition July – refill	New Bullards Bar water levels reduced by a maximum 100,000 acre-feet and 24 ft in elevation.	New Bullards Bar water levels reduced by a maximum 35,000 acre-feet and 8 ft in elevation.	Less-than-significant	Less-than-significant	
			Groundwater Substitution Flexible: 85,000 acre-feet Fixed: 35,000 acre-feet	Yuba River flows decrease April – June	Yuba River flow decreases by a maximum of 239 cfs	Yuba River flow decreases by a maximum of 195 cfs	Less-than-significant	Less-than-significant
American River Region	Stored Reservoir Water Flexible & Fixed: 20,000 acre-feet	Water is released from French Meadows and Hell Hole Reservoirs	French Meadows and Hell Hole Reservoir water levels are lower than the Baseline Condition June – refill	FM decreases by a maximum of 7,800 acre-feet and 8ft in elevation. HH decreases by a maximum of 12,200 acre-feet and 14ft in elevation.	FM decreases by a maximum of 7,800 acre-feet and 8ft in elevation. HH decreases by a maximum of 12,200 acre-feet and 14ft in elevation.	Less-than-significant	Less-than-significant	
			Flows in the Middle Fork of the American River are increased July – September	Middle Fork of the American River flow increases	Middle Fork of the American River flow increases	Less-than-significant	Less-than-significant	
		Water is held in French Meadows and Hell Hole Reservoirs during refill	American river flows are decreased during refill	American river flows are decreased during refill	American river flows are decreased during refill	Less-than-significant	Less-than-significant	

Table 10-9

Vegetation and Wildlife: Potential Transfer Amounts and Comparison of the Flexible and Fixed Purchase Alternatives

Decreases are release to point of diversion. Below point of diversion there are no decreases.
Increases are below point of diversion. Increases are less above point of diversion.

Region	Asset Acquisition or Management	Result	Effects on Vegetation and Wildlife	Flexible Alternative Change from Baseline	Fixed Alternative Change from Baseline	Significance of Flexible Alternative	Significance of Fixed Alternative	Comments
	Stored Reservoir Water, Groundwater Purchase, and Crop Idling Flexible: 41,000 acre-feet Fixed: 35,000 acre-feet	Water is held in Folsom Lake	Surface water elevation in Folsom Lake is lower than the Baseline Condition in July and August.	Surface water elevation in Folsom Lake is 0.8 foot lower than the Baseline Condition	Surface water elevation in Folsom Lake is lower than the Baseline Condition	Less-than-significant	Less-than-significant	
		Water is released from Folsom	Lower American River flows downstream of Folsom increased June – December	Lower American River flow increases	Lower American River flow increases	Less-than-significant	Less-than-significant	
	Crop Idling	Conversion of rice crops to bare fields	Reduced rice acreage in Placer County.	Idle a maximum of 3,200 acres.	Idle a maximum of 3,200 acres.	Less-than-significant	Less-than-significant	
Merced/San Joaquin River Regions	Groundwater Substitution Flexible & Fixed: 25,000 acre-feet	Water is held in Lake McClure	Slower decrease in water levels in Lake McClure in April – October compared to Baseline Conditions	Lake McClure contains as much as 25,000 acre-feet (a water surface increase of 3 feet) more compared to Baseline Conditions	Lake McClure contains as much as 25,000 acre-feet (a water surface increase of 3 feet) more compared to Baseline Conditions	Less-than-significant	Less-than-significant	
			Merced River flows decrease April – September	Merced River flow decreases by a maximum of 70 cfs	Merced River flow decreases by a maximum of 70 cfs	Less-than-significant	Less-than-significant	
		Water is released from Lake McClure	Merced River flows increase in October	Merced River flow increases by a maximum of 210 cfs	Merced River flow increases	Less-than-significant	Less-than-significant	

Table 10-9

Vegetation and Wildlife: Potential Transfer Amounts and Comparison of the Flexible and Fixed Purchase Alternatives

Decreases are release to point of diversion. Below point of diversion there are no decreases.

Increases are below point of diversion. Increases are less above point of diversion.

Delta Region								
Delta Region	Crop Idling, Groundwater Substitution, Stored Groundwater Purchase, Stored Reservoir Water Purchase	Water is released from reservoirs	Increased Delta outflows July – September	Outflows increase by a maximum of 1,635 cfs.	Outflows increase	Less-than-significant	Less-than-significant	
			Alterations in the position of X ₂	The position of X ₂ would be shifted by as much as 1.2 km closer to the Golden Gate Bridge	The position of X ₂ would be shifted			
Export Service Area								
Export Service Area	Crop idling	Conversion of cotton crop to bare fields	Reduced cotton crop acreage in Fresno, Tulare, Kings, and Kern Counties	Idle a maximum of 182,800 acres.	Idle a maximum of 177,300 acres.	Less-than-significant	Less-than-significant	Cotton does not provide suitable habitat for wildlife
	Stored Groundwater Purchase	Release of water from groundwater storage	Decrease in the amount of water available through KCWA water banks	A maximum of 165,000 acre-feet from water bank.	A maximum of 165,000 acre-feet from water bank.	Less-than-significant	Less-than-significant	
	Source Shifting	Water is released from SWP and/or Metropolitan Water District reservoirs	Decreased water levels in Castaic, Perris, Diamond Valley, and Mathews	Water levels decreased by a maximum of 200,000 acre-feet.	Water levels decreased by a maximum of 200,000 acre-feet.	Less-than-significant	Less-than-significant	
		Water is drawn from Anderson Reservoir	Decreased levels in Anderson Reservoir compared to the Baseline Condition.	Water levels decreased by a maximum if 20,000 acre-feet.	Water levels decreased by a maximum if 20,000 acre-feet.	Less-than-significant	Less-than-significant	
	Borrowed Project Water	EWA water is released from San Luis Reservoir earlier in the year compared to Baseline Conditions	Decreased water levels in San Luis Reservoir	San Luis is lower in July and August than under Baseline Condition	San Luis is lower in July and August than under Baseline Condition	Less-than-significant	Less-than-significant	

10.2.9 Mitigation Measures

The environmental measures presented in Section 10.2.4 have been developed to reduce effects to vegetation and wildlife to less than significant levels. As such no mitigation measures are proposed for vegetation and wildlife.

10.2.10 Potentially Significant Unavoidable Impacts

All effects on vegetation and wildlife would be less than significant with the environmental measures listed in Section 10.2.4; therefore no potentially significant unavoidable impacts occur within this resource category.

10.2.11 Cumulative Effects

The analysis of cumulative effects on vegetation and wildlife compares potential effects from other water transfer related actions and other projects occurring in the EWA action area to the Baseline Condition by evaluating the total effects to changes in quantity and/or quality of vegetation communities and the effect of these changes to associated wildlife. For example, if other water transfer programs include crop idling within the Sacramento Valley then the effects of the additional sources of crop idling when combined with EWA actions could be cumulatively significant.

A cumulative analysis for groundwater purchase actions can be found in Chapter 6 Section 6.2.9. The effect on vegetation and wildlife of each program considered in the cumulative analysis has been evaluated and would be covered by environmental documents developed for each groundwater program.

10.2.11.1 Upstream from the Delta

As described in Chapter 22, five water supply programs, in addition to EWA, are being included in the cumulative effects analysis. All five involve water acquisition upstream from the Delta and two downstream from the Delta.

Upstream from the Delta, four programs (Sacramento Valley Water Management Agreement, Dry Year Purchase Program, Drought Risk Reduction Investment Program, and CVPIA Water Acquisition Program) would participate in groundwater substitution actions (three of the four would only occur during dry years). All programs will conduct groundwater actions based on individual environmental documents required for the use of CVP and SWP facilities. The oversight of water transfers by Reclamation and DWR would ensure that the effects because of groundwater substitution actions on wetlands and other vegetation communities would be avoided or minimized. Groundwater substitution actions undertaken by other water supply programs would also be limited by water transfer capacities and the same criteria applied to the EWA program. Therefore, groundwater substitution would not present a cumulative effect on vegetation and wildlife resources.

Three programs (Sacramento Valley Water Management Agreement, Dry Year Purchase Program, and Drought Risk Reduction Investment Program) would include crop idling

as a water acquisition method (during dry years only). As with groundwater substitution, these programs, including EWA, would be limited by water export capacities. These limitations coupled with a 20 percent limitation by EWA agencies for water purchases related to crops idling within a county would control the amount of cropland idled for water supply programs (EWA agencies would limit or not acquire water through crop idling when the cumulative total of all programs is at 20 percent). Therefore, crop idling would not present any cumulative effects on vegetation and wildlife resources.

The purchase of stored reservoir water would potentially occur in all of the cumulative programs. The EWA analysis includes the maximum amount of water available from each reservoir. Therefore, the amount for purchase either by the EWA agencies or in combination with other projects evaluated in this section is the worst-case effect that could occur should all programs purchase stored reservoir water in any single year. Therefore, the analysis in this section can also be used as the cumulative analysis. The effect is considered less than significant.

Groundwater substitution would take place as part of two programs, the Drought Risk Reduction Investment Program and the CVPIA Water Acquisition Program. All actions would be coordinated by Reclamation and DWR transfer programs that will monitor for and address the effects from groundwater substitution actions on wetlands and other vegetation communities would be avoided or minimized. Therefore, groundwater substitution would not present a cumulative effect on vegetation and wildlife resources.

All of the cumulative programs would also contribute to changes in timing and levels of river flows. Water resource and development projects, such as dams and levees, and land uses, such as conversion to agriculture, have had significant effects on the regeneration potential of riparian forests (Strahan 1985). EWA water transfers would potentially exacerbate conditions that are currently unhealthy for riparian forest. However, the EWA program includes a monitoring and adaptive management plan that is tasked with ensuring effects of EWA actions on riparian habitats are either avoided or minimized. Coordination with other programs would also help to reduce potential cumulative effects on riparian habitat.

10.2.11.2 Export Service Area

Two programs, the Drought Risk Reduction Investment Program and the CVPIA Water Acquisition Program, would include crop idling in the Export Service Area. EWA crop idling actions reduce the acreage of this habitat. However, cotton does not provide habitat of value to wildlife; therefore idling of cotton crops under the EWA program would not affect vegetation and wildlife resources. Consequently EWA actions would not contribute to cumulative effects in the Export Service Area through crop idling actions.

EWA is the only program employing source shifting in the EWA Service Area; therefore, there is no cumulative impact to consider for this water management option. Overall, the EWA program would not contribute to cumulative effects on vegetation and wildlife resources.

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